U. S. DEPARTMENT OF AGRICULTURE,
WEATHER BUREAU.

BULLETIN A.

SUMMARY

OF

INTERNATIONAL METEOROLOGICAL OBSERVATIONS.

BY

H. H. C. DUNWOODY,

MAJOR, SIGNAL CORPS, U. S. ARMY,

ASSIGNED AS ASSISTANT CHIEF OF THE WEATHER BUREAU.

PUBLISHED BY AUTHORITY OF THE SECRETARY OF AGRICULTURE.

WASHINGTON, D. C.:
WEATHER BUREAU.
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LETTER OF TRANSMITTAL.

U. S. Department of Agriculture, Weather Bureau,
Washington, D. C., August 7, 1893.

Sir: I have the honor to transmit herewith a report giving a Summary of International Meteorological Observations, by Major H. H. C. Dunwoody, Assistant Chief of the Weather Bureau, and to recommend its publication as Weather Bureau Bulletin A.

Very respectfully,

Mark W. Harrington,
Chief of Weather Bureau.

Hon. J. Sterling Morton,
Secretary of Agriculture.

LETTER OF SUBMITTAL.

U. S. Department of Agriculture, Weather Bureau,
Washington, D. C., August 3, 1893.

Sir: I have the honor to submit herewith a report giving a Summary of International Meteorological Observations taken at noon, Greenwich mean time, from 1878 to 1887, inclusive, designed for the special use of forecast officials and observers of the Weather Bureau.

Acknowledgment of work performed in connection with the collation, reduction, and final preparation of the detailed data of this series of observations, and twenty-four of the charts and a portion of the tabulated data of this bulletin, are published in Appendix 17 to the Report of the Chief Signal Officer for 1891.

This work has been continued, and the additional charts and the discussion of this bulletin have been prepared, under my direction, by Mr. Edward B. Garriott, of the Weather Bureau.

Very respectfully,

H. H. C. Dunwoody,
Assigned as Assistant Chief of Weather Bureau.

Mark W. Harrington,
Chief of Weather Bureau.

Note.—Charts 38 and 39 not published.

SUMMARY OF INTERNATIONAL METEOROLOGICAL OBSERVATIONS.

Recognizing the importance of daily simultaneous observations covering the greatest possible part of the earth's surface as bearing upon the solution of many of the problems of meteorology, the Meteorological Congress convened at Vienna in September, 1873, formulated the plan of international observations conducted under the auspices and largely at the expense of the United States Weather Service from 1875 to 1887, inclusive.

This system of observations was proposed before the Congress by Brig. Gen. Albert J. Myer, Chief Signal Officer, U. S. Army, who undertook, on the part of the United States, the collection, compilation, and publication of the observations, and the distribution of the printed reports to co-operating observers throughout the world.

During the period, 1875 to 1887, the number of land stations, exclusive of United States and international polar stations, increased to a total of 459, and monthly reports were received from nearly 600 vessels distributed over the principal marine highways of the globe. For the entire period a grand aggregate of over 150,000 monthly reports, representing upward of 5,000,000 daily simultaneous observations, were received and prepared for publication at the office of the Chief Signal Officer at Washington City.

The following-named countries co-operated during a part or the whole of the period 1875 to 1887: Algeria, Australia, Austro-Hungary, Belgium, Brazil, Great Britain, Canada, Cape Colony, Chile, China, Costa Rica, Denmark, Egypt, France, Germany, Greece, Hawaiian Islands, India, Italy, Japan, Mauritius, Mexico, The Netherlands, Norway, Russia, Scotland, Spain, Sweden, Switzerland, and Turkey. In addition to reports furnished by regular services of the several countries, observations were made and forwarded from the islands of the North Atlantic Ocean, and from Central America, northern South America, Bering Island, the Aleutian Islands, Alaska, Greenland, and Iceland. The co-operation of the United States Navy was begun in 1877; observations were also received from a number of vessels of the merchant marine during that year. The co-operation of the navies of Great Britain, France, Sweden, Italy, and Portugal, and a number of the great steamship companies, foreign and domestic, and also of the "New York Herald Weather Service," closely followed. In 1877 sub-standard barometers for comparing and correcting ships' barometers were placed in the Maritime Exchange, New York City, and in the Merchants Exchange, San Francisco, Cal. In 1882 marine agencies for the collection of vessel reports and the comparison of instruments were established at the principal seaports of the Atlantic coast, and a considerable number of instruments for taking observations were issued to vessels of the United States Navy and to captains of vessels of the merchant marine.

Details for the establishment of international polar stations were arranged at meteorological congresses held at Hamburg in 1879 and at Saint Petersburg in 1881, and it was resolved that the series of polar observations should begin August 1, 1882. One of the United States expeditions under the command of First Lieut. (now General) A. W. Greely sailed from Saint Johns, N. F., July 7, 1881, and reached Lady Franklin Bay August 11, 1881; the other, under the command of First Lieut. P. H. Ray, Eighth Infantry, Acting Signal Officer, sailed from San Francisco, Cal., July 18, 1881, and reached Point Barrow, Alaska, September 8, 1881. Additional international polar stations were established as follows: By Austro-Hungary, at Jan Mayen; by Denmark, at Godthaab; by Finland, at Sodalynka; by France, at Orange Bay; by Germany, at Kingawa Fiord, Cumberland Sound, and at Royal Bay, S. Georgian Islands; by Great Britain and Canada, at Fort Rae, British America; by Holland, at Dicksonhaven; by Norway, at Bossekop; by Russia, at the Lena Delta and Nova Zembla; and by Sweden, at Spitzbergen.

The international publications of the United States Signal Service began with the issue of the Daily Bulletin of Simultaneous Observations, July 1, 1875. This publication was continued until June 30, 1884. Daily international charts were published from July 1, 1878, to June 30, 1884, and from October 1, 1886, to December 31, 1887. Storm-track charts of the Northern Hemisphere were prepared from November, 1877, to December, 1887, inclusive. The Monthly Summary and Review of International Observations was published from July, 1880, to December, 1887, the subject being embodied in the Monthly Weather Review prior to 1883. A tabulated summary of international observations was published from January, 1888, to June, 1889, after which the international work of the United States Weather Service was formally discontinued.

The preparation of charts summarizing the observations of this series was begun by First Lieut. (now Major) H. H. C. Dunwoody, U. S. Army, in the fall of 1886, and the work was continued at intervals during the ensuing five years.

The charts of monthly normal pressure, numbers 1 to 12, and monthly pressure changes, numbers 14 to 25, were published and described in Appendix 17 to the Annual Report of the Chief Signal Officer for 1891. For purposes of reference and study in connection with the work of forecasting it is considered desirable to republish the charts referred to, together with additional charts and enlarged text, in a form suitable for the use of forecast officials and observers of the Weather Bureau. Charts 26 to 37 show the departure of the normal pressure for each month from the annual normal pressure. Charts 40 to 51 indicate the number of storm-centers which passed over each square of five degrees, and the average frequency and direction of movement of storms over the Northern Hemisphere during the ten years, 1878 to 1887. These charts also show the track of each tropical storm traced during the period named. Chart 52 presents the aggregate number of storms traced, and Chart 53 the average tracks of storms by months and seasons. Charts 54 to 61 give lines of normal and mean pressure for months of marked variation from the normal temperature over considerable areas of the United States and Europe.

A description and discussion of the charts, together with tables and summaries detailing many important characteristics of the storms traced, are given in this Bulletin. Storms of the Bay of Bengal and the Arabian Sea are fully discussed in extracts from the Indian Reports.

MONTHLY NORMAL PRESSURE CHARTS.

JANUARY.

The January chart shows the mid-winter distribution of atmospheric pressure. In that month the pressure is high over the middle latitudes of the continents and Atlantic Ocean, and low in the Arctic regions and the northern parts of the Atlantic and Pacific oceans. The pressure is highest over east-central Asia, where it is above 30.60 (777) in an area which occupies the region about Lake Baikal and the headwaters of the Amoor and Lena rivers. A belt of high pressure extends from central Asia westward over central and southwest Europe, northwest Africa, the Atlantic Ocean between the 15th and 35th parallels, and the United States, with normal values above 30.20 (767) in Algeria, in a small area on the Atlantic Ocean between the 20th and 30th parallels and the 40th and 50th meridians, and in two small areas in the United States, one of which is located between the middle Mississippi Valley and the south Atlantic coast, and the other over the plateau region north of the 40th parallel. The lowest pressure appears over the west part of Bering Sea, and within an area which extends from southern Greenland over Iceland and Spitzbergen, where it falls below 29.50 (749).

This chart shows the extremes of high and low pressure over the Northern Hemisphere for the year. The pressure in the Asiatic area is the highest, and that in the Bering Sea and Greenland areas is the lowest noted for any month. The proximity of the Asiatic area of high and the Bering Sea area of low pressure exhibiting, respectively, the highest and lowest monthly normal pressure observed for the Northern Hemisphere, causes the remarkable barometric gradient of about 1.00 inch in 1,000 statute miles. The gradient from the Bering Sea area westward to the North American continent, and from the Greenland and Iceland area over Asia, Europe, and the Atlantic Ocean, is also marked.

The prevailing wind-directions over the Northern Hemisphere during January are also shown on this chart. Owing to the uniform distribution of pressure over the United States the winds over the southern half of North America are somewhat variable in character. An anticyclonic circulation is noticeable about the areas of higher pressure, and over the northern districts the directions are influenced by the two principal areas of low pressure over the northern oceans. Over the Atlantic Ocean the directions are well defined, being clearly cyclonic north of the 35th parallel, and anticyclonic south of that latitude. Over Europe north of the 50th parallel the directions are governed by the Iceland area of low pressure, while over central and southern Europe they are somewhat variable, owing to prevailing high pressure. The Asiatic winds are largely governed by the area of high pressure, and their general direction is seaward, the directions on the eastern coast being more clearly defined, owing to the influence of the Bering Sea area of low pressure.

FEBRUARY.

In February the position of the Asiatic area of high pressure is practically unchanged, save that a decrease of about .10 inch is shown when compared with the chart of the preceding month. The highest pressure appears about Lake Baikal, where it is above 30.50 (775). In the belt of high pressure which extends from Asia over southern Europe, northwestern Africa, the Atlantic Ocean between the 15th and 35th parallels, and south and west-interior parts of the North American continent, the pressure rises above 30.20 (767) in Algeria south of the Mediterranean coast line, in a small area over the Atlantic Ocean southwest of the Azores, and apparently in British America west of Hudson Bay. The February chart also shows the apparent development of an area of relatively high pressure over the Arctic Ocean north of eastern Asia. Compared with the preceding month the Greenland and Iceland area of low pressure is practically unchanged, the pressure continuing below 29.50 (749). A marked increase of pressure is shown in the Bering Sea area of low pressure. In February this low area extends from the south part of the Kamchatka Peninsula westward over the Aleutian Islands and the south part of Bering Sea to the Alaska coast near Sitka, with included values below 29.70 (754). As in the preceding month the Atlantic and Pacific areas of low pressure are apparently separated by a ridge of high pressure which passes over the Arctic regions and connects the Asiatic and North American areas of high pressure. Areas of relatively low pressure appear in February over the southwest part of the Indian Peninsula, and in the equatorial region of western Africa, where the normal values are below 29.90 (759).

The wind-directions over the Rocky Mountain and plateau regions of the United States are variable, owing to prevailing high pressure. The Bering Sea area of low pressure causes southerly winds on the Pacific coast north of the 40th parallel. High pressure in the interior and low pressure over the north part of the Atlantic Ocean govern the directions over the eastern part of the American continent, where they are mostly from southwest to northwest. Over the western and eastern parts of the Atlantic Ocean the influence of the Iceland area of low pressure is felt to Bermuda and the Madeira Islands, respectively, while over the ocean south of the 30th parallel the winds are anticyclonic about the high pressure area southwest of the Azores. It will be observed that the influence of the Iceland low area extends farther southward than during the preceding month. The Iceland low area governs the wind-directions of Europe north of the 50th parallel and along the immediate southwest coast, while over the Mediterranean and Black Sea districts the winds are somewhat variable, owing to prevailing high pressure. Over Asia the directions are generally anticyclonic. They are somewhat cyclonic in character over the south part of the Indian Peninsula, while along the eastern coasts of Asia they are governed by the North Pacific area of low pressure.

MARCH.

In March the highest pressure of the Northern Hemisphere appears within an area which occupies the interior of Asia and extends along the 50th parallel between the 80th and 120th meridians, where the values are above 30.30 (770). A marked decrease of pressure occurs in the Asiatic high area during this month, the included values being about .20 inch lower than for February. A slight decrease of pressure is shown in the belt of high pressure which extends over the Atlantic Ocean from northwestern Africa to the southeastern part of the United States, where the normal values are above 30.10 (764). A second area of high pressure, with values above 30.10 (764), occupies the north-central part of the North American continent from Manitoba to the Arctic Ocean east of the mouth of the Mackenzie River, and higher pressure undoubtedly obtains in the region of Great Slave Lake. The lowest pressure noted for March occupies an area extending from the northern coast of Norway to Nova Zembla, where it is below 29.60 (752). The Greenland and Iceland area of low pressure contracts westward, with normal readings below 29.70 (754), an increase of about .20 inch as compared with the preceding month, and the Pacific Ocean low area shifts position to the region east of the Aleutian Islands, with pressure below 29.70 (754), the included values being about the same as for February. The British India low area referred to in description of the February chart becomes well defined and occupies the interior of the Peninsula south of the 22d parallel, with values below 29.80 (757), a decrease of about .10 inch as compared with the preceding month. As in January and February the Asiatic and American areas of high pressure are apparently connected by a ridge of relatively high pressure which separates the Atlantic and Pacific low areas.

Although the Iceland low area shows a marked loss of energy in March, it continues to influence the wind-directions over the eastern part of the American continent, where the winds generally blow from the west quadrants; over the continent the winds are variable; while on the Pacific coast they are from west to south, being governed by the North Pacific low area. Over the Atlantic Ocean the wind-directions are controlled by the Iceland low area to the 40th parallel over the eastern part of the ocean, and the influence of this low area is felt in more southern latitudes over the western part of the Atlantic. The northeast trade winds are well defined south of the 30th parallel and east of the 40th meridian. The Iceland low area and the low area north of Scandinavia, Finland, and the White Sea govern the wind-directions over Europe north of the 50th parallel, and over eastern Europe to the Black Sea. Over the southwest part of the continent the winds are variable, owing to more uniform and relatively higher pressure. The decrease of energy shown in the Asiatic high area has its effect upon the wind-directions over that continent; they are anticyclonic over the interior districts. Along the northeast coasts the influence of the Pacific area of low pressure is noticeable, while over southern British India cyclonic winds attend the development of a low area over the southern part of the Indian Peninsula.

APRIL.

The April chart indicates the dissolution of the Asiatic area of high pressure. The North American high area is farther north than for the preceding month, it extends from the interior of the continent over the polar region, and the pressure is relatively high thence to central and western Asia, with pressure above 30.10 (764) over east-central Asia and in an area extending from the polar region to the interior of the American continent in about latitude 55°. The pressure is also above 30.10 (764) from the west coast of Africa between the 20th and 30th parallels south of west over the Atlantic Ocean to the 50th meridian. The lowest pressure is observed over the Pacific Ocean west of the Aleutian Islands and the Alaska Peninsula, and over the interior of British India, where it is below 29.70 (754). The Iceland and Greenland area of low pressure exteuds southwestward to the 50th parallel, with values below 29.80 (757), an increase of about .10 inch as compared with the pressure in that region for the preceding month. The British India area of low pressure extends its limits and covers the entire Peninsula, save along the coasts, and the pressure falls below 29.70 (754) over the interior districts, a decrease of about .20 inch as compared with the March readings. In the tropical regions of western Africa the normal pressure continues below 29.90 (759). As shown by charts of the preceding months, the Asiatic and American high areas are connected by a ridge of high pressure extending over the Arctic region, which separates the Atlantic and Pacific low areas.

The slight barometric gradients over the greater part of the North American continent result in variable winds generally over the United States. The influence of the Iceland low area is felt over the northeastern part of the country. The Iceland low area controls the winds over the western part of the Atlantic Ocean to the vicinity of Bermuda; over the eastern part of the ocean they are anticyclonic south of the 40th parallel. The trade winds are well defined over the eastern part of the ocean to the 35th parallel. Over northern Europe, and in the eastern districts of the continent north of the 50th parallel, the winds are generally from south to west under the influence of the Asiatic high area and the Iceland area of low pressure. In the Black Sea and Mediterranean districts, and over southwestern Europe, the wind-directions are variable. Over Asia the wind-directions are variable, save over the Indian Peninsula, where they are governed by the low pressure area which occupies the central provinces.

MAY.

In May the highest pressure appears over the Atlantic Ocean southwest of the Azores, where it is above 30.20 (767), and the pressure is high over the Pacific Ocean about the Hawaiian Islands, where it is above 30.10 (764). In the Atlantic Ocean high area an increase of about .10 inch occurs. Two areas of relatively high pressure, with readings above 30.00 (762), appear, one reaching from the interior of the American continent over the polar regions and the other extending over the interior of Asia along the 60th parallel. The Asiatic high area has practically disappeared, and a marked increase of pressure is shown over the oceans in the middle latitudes. The lowest pressure

of this month is shown over the interior of British India, where the values fall below 29.60 (752), a decrease of about .10 inch as compared with the preceding month. The Iceland and Greenland low area is ill defined, and an extended area of low pressure appears over the ocean from Greenland to Scandinavia, with readings below 29.90 (759). The Bering Sea low area has lost its individuality, and a condition of relatively low pressure extending from Bering Sea northwestward to the northern coast of Asia is shown. In this month two low pressure areas develop over the North American continent, with normal pressure below 29.90 (759), one appearing in the lower Colorado Valley and the other over northern Montana and the adjoining part of the British Northwest Territory. The formation of an area of low pressure with values below 29.90 (759) is also indicated over south-central Europe.

Over the eastern part of the United States the wind-directions are anticyclonic, as governed by the Atlantic Ocean high area. Over the interior of the United States they are cyclonic under the influence of the newly-formed low areas referred to, and the influence of these low areas appears to extend to the Pacific coast, where the winds are generally from the western quadrants. Over the Atlantic Ocean the winds are anticyclonic south of the 40th parallel, and the influence of the high area is felt over the eastern part of the ocean to the coast of Portugal. East of the 30th meridian the northeast trade winds are well defined to the 40th parallel. Owing to slight barometric gradients, the European wind-directions are generally variable, except over Scandinavia and the British Isles, where they are from the south quadrants, and over south-central Europe, where they have a rather ill-defined cyclonic circulation. Over the greater part of central and southern Asia the wind-directions are governed by the British India low pressure area, save on the eastern coast, where they are variable.

JUNE.

In June the highest pressure of the Northern Hemisphere is shown in the Atlantic Ocean high area which extends from the Azores southward to the 25th parallel and south of west to the 52d meridian, with values above 30.20 (767). An area of high pressure apparently occupies the Middle Pacific Ocean, where the readings are above 30.10 (764) over the Hawaiian Islands. Over the continents and the Arctic regions the pressure is low. It is lowest over the northern part of British India, where it falls below 29.50 (749), and is below 29.70 (754) over the south part of the Kamchatka Peninsula, and apparently over the Arctic Ocean north of eastern Siberia. The Iceland low area is more marked than for the preceding month, and the normal pressure falls below 29.80 (757) from Iceland over southern Greenland. Over the North American continent the pressure falls below 29.80 (757) over the west part of the southern plateau region, and areas of relatively low pressure, with values below 29.90 (759), appear over the middle plateau region and over the upper Missouri and Saskatchewan valleys. In this month the Atlantic Ocean high area enlarges, with a general increase of pressure over and southwest of the Azores. A slight increase of pressure is also noted over the Hawaiian Islands, Pacific Ocean. The British India low area moves northward, with a decrease of pressure of about .10 inch, and the pressure decreases over the entire continent of Asia. A decrease of pressure occurs over the Arctic, Bering Sea, and Iceland and Greenland regions; a decrease is also shown over the plateau region of the North American continent.

The Atlantic high area in conjunction with the Iceland area of low pressure causes southerly winds over the United States east of the Mississippi River. In districts west of the Mississippi River the wind-directions are governed by a trough of low pressure which extends over the plateau region. The Azores high area influences the wind-directions of the Atlantic Ocean, the direct influence of the Iceland low area being noticeable in the higher latitudes. The winds of Europe, while somewhat variable, are mostly from the southern quadrants, owing to low pressure in the Arctic regions. The winds over the continent of Asia are governed by the cyclonic area which occupies the south-central districts. Over the Japanese Islands the wind-directions are variable.

JULY.

The July chart presents the mid-summer distribution of pressure. The pressure is high over the south-middle latitudes of the oceans, and low over the continents and the Arctic regions. The Atlantic Ocean high area occupies about the same position, with slight changes of pressure, as compared with the preceding month, and a slight decrease of pressure is shown over and near the Hawaiian Islands, Pacific Ocean. The lowest pressure for the month appears in an area which extends from the region lying north of the Indian Peninsula, Asia, westward to the Persian Gulf, where it is below 29.50 (749). In an elongated area extending from the Kamchatka Peninsula over the polar regions to Iceland, and in an area which occupies the northeast part of the American continent and the islands of the Arctic Ocean lying west of Greenland, the normal pressure is below 29.70 (754). An area of relatively low pressure occupies the middle and west parts of the southern plateau regions of North America, with central pressure somewhat higher than for the preceding month. In this month there is a very slight increase of pressure over the Azores Islands, where in the summer months the pressure is the highest observed over the Northern Hemisphere. The low areas noted in June over the Kamchatka Peninsula, over the Arctic Ocean north of eastern Asia, and over Iceland and southern Greenland have united, and the low area central west of Hudson Bay in the preceding month has advanced northeastward. The Asiatic low area, which exhibits the lowest pressure of the Northern Hemisphere during the summer season, occupies a larger area than in June, the minimum pressure, 29.60 (752) to 29.70 (754), is, however, somewhat higher than for that month at extreme northern British India stations.

Over the United States the wind-directions are generally southerly in July, except on the north Pacific coast, where northerly winds prevail. East of the Rocky Mountains the winds are mostly from the southwest, owing to the influence of the Atlantic high area and the low pressure areas of the Arctic regions. West of the Rocky Mountains the directions are somewhat variable. The winds of the Atlantic Ocean conform to the Azores high area, and the influence of the Arctic low area is scarcely appreciable, save in the high latitudes. European wind-directions are variable, as these districts form what may be termed the middle ground between the principal high and low areas. The position of the Asiatic low area gives the seasonal southwest winds over the west part of the Indian Peninsula, and south to east winds prevail along the southern coasts east of India.

AUGUST.

In August the Atlantic Ocean high area contracts and the normal pressure over and near the Azores, 30.20 (767) to 30.23 (768), is slightly lower than for the preceding month. There is also a slight decrease of pressure over the Pacific Ocean about the Hawaiian Islands, where the normal pressure for August is 30.07 (764) at Honolulu. The Asiatic area of low pressure occupies a much smaller area than for the preceding month, and is central over extreme northwest British India, where the normal values are below 29.50 (749). Two areas of low pressure with values below 29.70 (754) appear, one over Iceland and the other north of the Hudson Bay region. A slight decrease of pressure is shown in the southern part of the low area which occupies the plateau region of the United States. In this month a change from the mid-summer distribution of pressure is apparent. A general decrease of pressure occurs over the oceans, while over Asia, where the continental pressure is more clearly marked, there is an increase of pressure. The Iceland low area assumes individual form, while over the immediate polar regions there is an increase of pressure.

The wind-directions over the eastern part of the United States are not so clearly influenced by the Atlantic high area, and are variable, except in the extreme northeast districts, where they are governed by low pressure areas east and west of Greenland. Over the western part of the country the winds are largely influenced by the plateau region area of low pressure. In the middle and lower latitudes of the Atlantic Ocean the winds are anticyclonic, while over the northern part of the ocean the influence of the Iceland low area is felt. The winds of southwestern Europe are influenced by the Atlantic high area; south to west winds generally prevail over central, western, and northwestern Europe, while over European Russia they are variable. The winds of southern and central Asia are cyclonic about the low pressure area of northwest British India. The influence of this low area is also appreciable on the east coasts and over the Japanese Islands.

SEPTEMBER.

In September the pressure in the Atlantic Ocean high area falls below 30.20 (767), and the highest pressure of the Northern Hemisphere appears within an area bounded by the isobar of 30.10 (764), which extends from the extreme east part of the ocean between the 30th and 40th parallels westward to the east central part of the United States. An area of relatively high pressure, with values above 30.00 (762), appears over the interior of northeastern Asia, and the pressure is above 30.00 (762) from the Hawaiian Islands to the north Pacific coast, and thence over the interior of British America. The lowest pressure of the month is shown within three areas bounded by isobars of 29.70 (754), one of which occupies the region extending from northern British India to the Persian Gulf, another the eastern part of Bering Sea, and the third extends from Iceland and east Greenland over Spitzbergen and the polar regions to the Arctic coast of Asia between the 130th and 150th meridians. In this month the continental pressures are higher, and there is a decrease of pressure over the oceans. The Asiatic high area begins to assume form, and there is a marked increase of pressure over the southern part of the continent. The Iceland and Bering Sea low areas become well defined, and the plateau region area of low pressure of the North American continent disappears.

The westward extension of the Atlantic high area over the east-central part of the United States, and the rather uniform distribution of pressure over the western part of the North American continent, causes variable winds over the United States, except in the extreme northwest districts, where the influence of the Bering Sea low area is felt. The winds of the Atlantic Ocean are anticyclonic south of the 45th parallel, while to the northward of that latitude they are governed by the Iceland and Greenland area of low pressure. Over western Europe north of the 50th parallel south to west winds prevail; over the balance of Europe the winds are variable. The influence of the British India low area is limited, as compared with the summer months. The development of a high area over the northeastern part of the continent causes variable winds over a great part of Asia, and the winds are generally variable on the eastern coasts and over the Japanese Islands.

OCTOBER.

The highest October pressure appears over east-central Asia, where the winter high area has assumed form, and the values rise above 30.30 (770) in the upper valley of the Lena River. The Atlantic Ocean high area extends from the 50th meridian eastward over the Azores to the northwest coast of Africa, with readings above 30.10 (764). An area of high pressure with values above 30.10 (764) occupies the United States east of the Rocky Mountains and south of the 40th parallel, and the pressure is above 30.10 (764) in a small area on the north Pacific coast of the United States. The lowest pressure of the month is shown in an area which occupies the eastern part of Bering Sea and the eastern Aleutian Islands, where it is below 29.60 (752), and the pressure is below 29.70 (754) in an area which extends over and east of southern Greenland. The British India low area has practically disappeared, and the lowest pressure in that region appears over the extreme northwest part of the Peninsula, where it is below 29.80 (757). This chart shows the rapid formation of the continental high areas, and the North Atlantic and North Pacific low areas. Over east-central Asia the pressures have increased about .30 inch, and an increase appears over the entire United States. The Bering Sea low area shows a decrease of pressure of about .10 inch, and the Iceland low area begins to assume its winter position. A belt of high pressure encircles the Northern Hemisphere in the middle latitudes, and a trough of low pressure connects the Iceland and Bering Sea low areas.

Along the immediate Atlantic coast south of the 35th parallel, and over Texas and the southeast slope of the Rocky Mountains, the wind-directions are anticyclonic about the high area which occupies the southeastern part of the United States, and over the extreme northeast and northwest districts the directions are governed by the Iceland and Bering Sea low areas, respectively. Owing to counter influences of the high area over the southeast part of the United States and the Azores high area, variable winds prevail in October from the south Atlantic coast to the 55th meridian. The Iceland low area governs the winds of the North Atlantic to the 40th parallel. Over the greater part of Europe the winds are mostly from the southern quadrants, except in the Mediterranean districts, where they are northerly. The winds of Asia become continental and blow out from the high area which occupies the east-central part of the continent. On the east coast north of the 40th parallel the influence of the Bering Sea low area is felt.

NOVEMBER.

In November the Asiatic high area occupies a large part of the interior of the continent, with normal values above 30.30 (770). A belt of high pressure bounded by the isobar of 30.10 (764) extends from the east-central part of the Pacific Ocean over the United States and the Atlantic Ocean, extreme southwestern Europe, and northwestern Africa. A loop from this high area extends northward over the interior of British America. The Iceland and Bering Sea low areas are well defined, with pressure below 29.60 (752), with a connecting trough of relatively low pressure extending over the polar regions. In this month the continental high pressures extend their influence over the oceans in the middle latitudes and over the Arctic Ocean north of central and western Asia and British America. The Bering Sea low area extends westward to the Kamchatka Peninsula, and a decrease of about .10 inch occurs in the Iceland low area. Variable winds prevail over the United States south of the 40th parallel, while over the northeast and northwest districts the influence of the North Atlantic and North Pacific low areas is appreciable. The Iceland low area controls the winds of the Atlantic Ocean to the Bahamas and over the eastern part of the ocean to the 40th parallel. Southerly winds prevail over Europe, except in the Mediterranean districts, where they are northerly. The Asiatic wind-directions are anticyclonic, except on the east coast north of the 40th parallel, where the influence of the Bering Sea low area is felt.

DECEMBER.

In December the pressure in the Asiatic high area rises above 30.50 (775), an increase of about .20 inch when compared with the preceding month. An area of high pressure, with readings above 30.20 (767) appears over the southeast part of the United States, and pressure 30.20 (767) and above is indicated over Mexico and about Great Slave Lake, British America. Isobars of 30.10 (764) surround an area which covers the United States and the interior of British America west of Hudson Bay, and a belt of high pressure which extends from the coast of the United States south of the 40th parallel eastward over the Atlantic Ocean to the Spanish Peninsula and Algeria. The Iceland low area shows a decrease of about .10 inch, and the Bering Sea low area occupies a somewhat smaller area than for the preceding month. In this month the continental high areas assume larger proportions, and extending northward show a connecting ridge of relatively high pressure passing over the Arctic Ocean north of Asia.

The wind-directions are anticyclonic over the greater part of the United States. The influence of the Iceland low area is felt over the Atlantic Ocean to the 30th parallel. The winds of Europe are from the south quadrants, except in the Mediterranean districts, and the Asiatic winds are continental, the influence of the Bering Sea low area being felt to the northern Japanese Islands.

ANNUAL NORMAL PRESSURE.

The highest annual pressure is shown in an area which occupies the region about the headwaters of the Lena and Yenisei rivers in Asia, where it rises above 30.20 (767). The pressure is above 30.10 (764) in a belt extending from Algeria westward over the Atlantic Ocean to the southeastern part of the United States, and the pressure is above 30.00 (762) generally in the middle latitudes of the Northern Hemisphere. The lowest pressure appears in two areas, one of which extends from southern Greenland over Iceland and Spitzbergen and the other from the south part of the Kamchatka Peninsula over the Aleutian Islands and the south part of the Alaska Peninsula, in each of which the values fall below 29.70 (754). An area of relatively low pressure occupies the central and northern districts of British India, where the readings are below 29.80 (757), and the pressure is generally below 29.90 (759) in the equatorial regions of Asia, Africa, and the Indian Ocean, and north of the Arctic Circle, except in north-central North America and northwest and north-central Asia.

NORMAL TEMPERATURE AT NOON, GREENWICH TIME (in degrees Fahrenheit).

Charts 1 to 13 exhibit, in addition to lines of normal atmospheric pressure, the normal distribution of temperature over the Northern Hemisphere at hours corresponding to noon, Greenwich mean time.

The lowest normal temperature for the Northern Hemisphere is reported at Werchojansk, Siberia, in latitude north 67° 34′, longitude east 133° 51′, in January. This station has an elevation of about 164 feet above sea-level, and is situated between ranges of the Werchojansk Mountains on the Jana River, which flows northward and empties into the Arctic Ocean about 200 miles east of the Lena River. The January normal temperature at Werchojansk for the hour corresponding to noon, Greenwich time, is 60 below zero. In an area extending from the upper valley of the Lena River over the polar regions and thence over the interior of British America west of Hudson Bay to about the 60th parallel the January normal temperature is 30 to 40 below zero. In that month the line representing zero mean temperature reaches the middle Missouri Valley in the United States, crosses central Greenland, passes north of Spitzbergen and Europe, and is traced southeastward over Asia to the Amoor River, and thence northeastward over the Sea of Okhotsk, extreme northeastern Siberia, and the interior of Alaska. The January chart shows highest mean temperature, 80, in Ceylon, the west-central part of the Indian Peninsula, and in the Barbados Islands, West Indies, and the normal values are above 70 in eastern Asia south of the 20th parallel, over southern and western parts of British India, and over the southwest part of the North Atlantic Ocean. A notable feature of the mid-winter distribution of temperature is the marked gradient south of Newfoundland and Nova Scotia, where the temperature changes 3 to 5 with each degree of latitude.

In February the Werchojansk temperature is 9 higher than for the preceding month, while in an area extending from the mouth of the Lena River over the polar regions and thence over British America to Great Slave Lake the monthly normal is 40, or more, below zero, is 4 to 8 lower than for January, and is the lowest noted in these regions for the year. The line of zero mean temperature is traced to the valley of the Red River of the North in the United States, crosses Greenland farther south than in January, and follows about the same course over Asia and Alaska. As compared with January the temperature over British India is about 10 higher. The temperature is generally higher over the continents, while over the oceans the changes from January to February are slight.

The March chart shows a decided rise in temperature in the Arctic regions and generally over the continents. At Werchojansk the rise amounts to 20, and at Lady Franklin Bay to 17. The line of zero mean temperature does not reach the United States. It crosses Greenland in about the same latitude as in January, is about 10 farther north in eastern Asia, and follows nearly the same course over Alaska as in January and February. Over the interior of the Lower Indian Peninsula the normal readings rise above 90 in March.

The April normal temperature at Werchojansk is 3 above zero, 34 higher than for March. A marked rise in temperature is also shown in all the regions of the Northern Hemisphere, except along the Pacific coast of the United States. The lowest mean temperature for this month appears

in an area extending from Great Slave Lake, British America, over Lady Franklin Bay and the polar region, where the readings are 10, or more, below zero, and the area of zero mean temperature reaches central Greenland and northern Siberia. The normal temperature is above 90 over the interior of the Indian Peninsula, and rises to 83 at Manila, Philippine Islands, where the mean for March is 81. The April normal readings are above 70 over the interior of Algeria, generally over the North Atlantic Ocean south of the 30th parallel, and over the Gulf of Mexico.

No mean temperatures below zero are recorded on the May chart, the lowest mean, 12, being shown by the "Jeanette" observations in the Arctic Ocean north of eastern Siberia. At the Lena Delta and Lady Franklin Bay the mean for May is 16 above zero, and at Werchojansk the mean reading is 34. Over the interior of British India the normal values in May are above 100, and are the highest of the year. In this month the temperature is above 70 generally over Asia south of the 50th parallel, over southeastern Europe, the interior of Algeria, the North Atlantic Ocean south of the 30th parallel, and over the Gulf of Mexico. Over the West India Islands, except in western Cuba, the noon, Greenwich time, mean temperature for May is above 80.

The lowest mean temperature for June, 24, is reported at Spitzbergen. At Point Barrow, Alaska, the mean is 31, and at Great Slave Lake, British America, and Lady Franklin Bay, 32. At Werchojansk a mean reading of 52 is recorded. At interior stations in Upper British India the mean is above 100, while in Lower British India it falls below 90. Mean readings above 80 are shown about the Caspian and eastern and southern Mediterranean seas, and in the interior of Algeria they are above 90. An area of 80 and above covers the West Indies, and extends generally over the Caribbean Sea and the Gulf of Mexico.

In July the Werchojansk noon, Greenwich, mean temperature is 57, 117 higher than the January mean. In this month the area of lowest temperature covers the polar regions, northern Greenland, and northeastern Siberia, and the lowest mean reading, 33, is shown by the "Jeanette" observations. At Lady Franklin Bay and Point Barrow the July mean is 36. Over British India the temperature is decidedly lower than for June, the highest mean reading, 95, being shown at Lahore, while over the southwest part of the Peninsula the monthly values fall below 80. A marked rise in temperature is shown over southwestern Asia and southern Europe, where the mean values are above 80, and in the interior of Algeria the means range from 96 to 98.

The "Jeanette" mean temperature, 31, is the lowest reported for August. In an area covering the polar regions, northern Greenland, northern Siberia, and the interior of British America to about Great Slave Lake, the mean readings are below 40. In British India the highest mean temperature, 92, is noted at Lahore. Over the interior of Asia the mean temperature averages about 10 lower than for July. The mean values continue above 80 over southern Europe, and are above 90 in the interior of Algeria. The North Atlantic and American temperatures show slight changes as compared with the preceding month.

The September chart shows a fall in temperature of about 20 in the polar regions; the lowest mean noted being 14 at Lady Franklin Bay, a fall of 20 as compared with August. The area of 30 temperature, or below, covers the polar regions, northern Greenland, northeastern Siberia, and the interior of British America to Great Slave Lake. In all of the regions named the mean temperature is about 10 lower than for August. A general fall in temperature is shown over the continents and the northern parts of the oceans, except in British India, and along the Pacific coast of the United States, where the mean values are about the same as for the preceding month.

In October an area within which the temperature falls below zero extends from Werchojansk and the lower valley of the Lena River over the polar region and Lady Franklin Bay, the lowest mean, 8 below zero, being noted at Fort Conger, Lady Franklin Bay, a fall of 22 as compared with the September chart. While the fall in temperature is more marked over the Arctic regions lower mean values are noted generally over the Northern Hemisphere in this month.

The November mean at Werchojansk is 40 below zero, 38 lower than for October. At Lady Franklin Bay the mean is 26 below zero, 18 lower than for the preceding month. In November the line of zero mean temperature reaches the vicinity of Great Slave Lake, British America, and is traced thence over north-central Greenland, thence south of Spitzbergen, thence over Siberia to the upper valley of the Lena River, and thence over northeastern Siberia and northern Alaska. In British India the mean temperature is above 80 only over the western and extreme southern parts of the Peninsula. Over southern Europe, Algeria, and the interior of the United States the mean readings are about 10 lower than for October, and the area of 80 temperature of the North Atlantic Ocean has contracted to the tropical region east of the 60th meridian.

In December the Werchojansk temperature is 56 below zero, 4 higher than the January mean, and the normal values are below —20 in an area extending from the upper Lena River over the polar regions, and thence to the northwest part of Hudson Bay. The line of zero mean temperature reaches southern Manitoba, crosses central Greenland, passes south of Spitzbergen, and is traced southeastward over Siberia to the Amoor River, and thence over northeastern Siberia and central Alaska. Normal temperature above 80 is reported only at the Barbados, West India Islands, and is above 70 over the Indian Peninsula and the North Atlantic Ocean south of the 30th parallel.

The chart of annual normal temperature at noon, Greenwich time, shows the lowest value, 4 below zero, at Fort Conger, Lady Franklin Bay. At Werchojansk, Siberia, —2 is noted, and at Fort Rae, British America, the mean reading is zero. In an area extending from northeastern Siberia over the polar regions and thence over the interior of the North American continent to about the 58th parallel the normal readings are below 10. The highest annual normal temperature is shown generally over the Indian Peninsula, over the Atlantic Ocean east of the Windward Islands, and at Manila, Philippine Islands, where it is 80, or above, and the normal values are above 70 over the North Atlantic Ocean south of the 30th parallel, over the Gulf of Mexico, along the western coast of Mexico, and over extreme southern Asia and the interior of Algeria.

NORMAL PRESSURE CHANGES.

Charts 14 to 25 show changes in normal pressure from month to month.

DECEMBER TO JANUARY.

This chart shows an increase of pressure over eastern and southern Asia, Europe, the South Atlantic Ocean, and a great part of the North American continent. The greatest increase is shown over Scandinavia, where it exceeds .20 inch, the increase is more than .15 inch in east-central Asia, more than .10 inch in the interior of British America west of Hudson Bay, and more than .05 inch in an area about midway between the Azores and the Windward West India Islands. A decrease of pressure appears in the Arctic regions, over the North Pacific and North Atlantic oceans, and in an area extending from the Arctic Ocean southward between the 70th and 100th meridians of east longitude to British India. There is also an apparent slight decrease of pressure in the equatorial region of the west coast of Africa, and over the Pacific Ocean about the Hawaiian Islands. The most marked decrease of pressure occurs in an area extending from Spitzbergen to Nova Zembla, where it is more than .20 inch, and the decrease exceeds .10 inch over a large part of the Arctic region.

JANUARY TO FEBRUARY.

A very decided increase of pressure is shown off the coast of northeastern Asia, the monthly change being more than .30 inch in an area extending from the north part of the Sea of Okhotsk over Bering Island. The increase is also marked over the Arctic Ocean from the mouth of the Lena River to Nova Zembla, and a slight increase appears over central and northeastern Europe, in an area over the Atlantic Ocean south of the Azores, and from Labrador and the Hudson Bay region northward over west Greenland and the Arctic Ocean to the westward. A decrease of pressure appears generally over the continents, the Atlantic Ocean, and the Pacific Ocean in low latitudes, the most marked decrease occurring in areas in east-central and north-central Asia and over the Atlantic Ocean north of the 50th parallel, where it was more than .10 inch. In areas in the United States west of the Mississippi River, and over the greater part of interior and southwestern Asia, the decrease exceeds .05 inch, and at Honolulu, Hawaiian Islands, it is .02 inch.

FEBRUARY TO MARCH.

The pressure continues to decrease over the continents and the west part of the Atlantic Ocean. The most marked decrease occurs in a small area east of the Caspian Sea, where it is more than .20 inch, and the decrease is more than .10 inch over a great part of Asia and Europe, in New England and the Canadian Maritime Provinces, and in the Saskatchewan Valley, British America. Over a great part of the Arctic Ocean and the northern part of the American continent, and thence over the Atlantic Ocean to the Azores there is an increase of pressure, the increase being greatest in an area extending from the polar regions over Greenland, Spitzbergen, Iceland, and the eastern Atlantic Ocean to the 50th parallel, where it exceeds .15 inch. An increase of pressure also occurs over the Middle Pacific Ocean, and over the Atlantic Ocean in low latitudes. At Honolulu, Hawaiian Islands, the increase is .04 inch, and about the Cape Verde Islands, Atlantic Ocean, it is .02 to .04 inch.

MARCH TO APRIL.

An increase of pressure occurs from the east part of the American continent north of the 40th parallel over the polar regions, Greenland, Iceland, extreme northern Scotland, and the middle and northern districts of the continent of Europe, the greatest increase being noted in an area extending over Nova Zembla and extreme northern Norway and Finland, where it exceeds .25 inch. A general increase of pressure is shown over the Pacific Ocean north of the 20th parallel, and over the Atlantic Ocean south of the 15th parallel. Except over central and northern Europe, a decrease of pressure occurs generally over the continents, the most marked decrease being shown in an area extending from the Yellow Sea to the valley of the Lena River, in Asia, and in the interior of British America about Great Slave Lake, where it is more than .20 inch. In an area occupying western Europe between the 40th and 50th parallels, and in the region north of British India, the decrease of pressure is more than .15 inch.

APRIL TO MAY.

A marked increase of pressure is shown over the oceans, and the area of increase extends from the Atlantic Ocean over western Europe and eastern North America. The greatest increase appears in an area east of Newfoundland, where it exceeds .20 inch, and the increase is more than .10 inch over the middle latitudes of the Atlantic Ocean, over western Europe between the 40th and 50th parallels, and over the North Pacific Ocean east of Alaska Peninsula. A decrease of pressure occurs over northern and eastern Europe, Asia, and the central, north-central, southern, and southwestern districts of North America, the most marked decrease occurring in an elongated area extending from the Yellow Sea to the polar region, where it is more than .20 inch. A slight decrease is shown over extreme southeast and southwest parts of the North Atlantic Ocean.

MAY TO JUNE.

There is an increase of pressure over the southern half of the Atlantic Ocean, and this area of increase extends over southwestern Europe and the southeastern part of the American continent. The pressure increases over the Pacific Ocean, and thence over Bering Sea. The increase is small when compared with that noted for preceding months, and is greatest over the Atlantic Ocean from the Azores to the Spanish Peninsula and Algeria, where it is more than .05 inch. Over the Arctic regions and generally over the continents there is a decrease of pressure, the decrease being most marked from Nova Zembla over the polar regions to the region north and northwest of Hudson Bay, where it was more than .20 inch. The decrease was more than .10 inch over almost the entire continent of Asia, and thence over the Arctic regions to the north-central and northeastern parts of the American continent.

JUNE TO JULY.

The minimum pressures of the year are reached over the interior of the continents, and the maximum pressures of the year in the principal oceanic high area which occupies the mid-Atlantic Ocean south of the 40th parallel. From June to July there is an increase of pressure over the central and southern parts of North America, the increase amounting to more than .05 inch on the middle-eastern and southeastern slopes of the Rocky Mountains. There is also an increase of pressure in an area extending from the Gulf of Mexico and the West Indies over the Atlantic Ocean to the Bay of Biscay, and thence over southern Europe. The pressure increases over a great part of the Peninsula of British India, from Bering Sea over the Japanese Islands, and in north-central Asia and the adjacent Arctic Ocean. The pressure decreases over the northern half of the American continent and the Arctic Ocean to the northward, over the Atlantic Ocean in high latitudes, over northern and eastern Europe, and over Asia and the Arctic regions, except over and north of the north-central part of the continent. The most marked decrease of pressure occurs from Hudson Bay northward west of Greenland, where it is more than .15 inch, and the decrease is more than .10 inch in areas in the west interior of Asia.

JULY TO AUGUST.

This chart shows general changes from the mid-summer distribution of pressure over the Northern Hemisphere. The continental pressures increase, and there is a decrease of pressure over the oceans. Over the south-central part of the continent of Asia, where the lowest summer pressure is noted, there is an increase of pressure of .05 to .10 inch. The pressure increases .05 to .10 inch in an area extending from Bering Sea over the polar regions and the northern half of Greenland, and an increase of more than .05 inch occurs from the south Hudson Bay region over the Saint Lawrence Valley and New England. There is a decrease of pressure over central and western Europe south of the 55th parallel, over the Atlantic Ocean, the southern and western parts of the North American continent, and over the Pacific Ocean, except from the Japanese Islands to Bering Sea. The decrease of pressure is generally small, and is more than .05 inch in an area extending from south and west of the British Isles south-southwest over the Atlantic Ocean to the 10th parallel. The decrease is about .05 inch over the Florida Peninsula and the Bahama Islands, over a part of western Mexico, and at Honolulu, Hawaiian Islands.

AUGUST TO SEPTEMBER.

The pressure continues to increase over the continents, and there is a general decrease of pressure over the oceans and the Arctic regions. The greatest increase of pressure occurs in an area extending east and west over Asia between the 40th and 50th parallels, where it exceeds .20 inch, and the increase is .10 to .20 inch over eastern Europe. In an area extending over the eastern part of the United States and thence over the Hudson Bay region to the Arctic Ocean, and in an area extending from the Pacific coast in about latitude north 40° to the upper Missouri Valley the increase exceeds .05 inch. There is also a slight increase of pressure over the Atlantic Ocean from the northwestern coast of Africa to Newfoundland and the United States coasts. A decrease of pressure occurs generally over the Pacific Ocean, over the Atlantic Ocean, except in a strip in the middle latitudes, in the polar regions, and over the Arctic Ocean north of Europe and Asia. The most marked decrease occurs in an area over the east part of Bering Sea, where it is more than .15 inch, and the decrease is more than .05 inch from the north coast of Asia west of the mouth of the Lena River over the Arctic Ocean, Greenland, Iceland, and the Atlantic Ocean to about the 55th parallel. The decrease is also more than .05 inch from the west coast of North America north of the 50th parallel westward over the eastern half of Bering Sea and southward toward the Hawaiian Islands to the 30th parallel.

SEPTEMBER TO OCTOBER.

A decided increase of pressure occurs over Asia, and in an area extending from the Yellow Sea to the Persian Gulf the increase is more than .20 inch. The area of increase of pressure extends from Asia over the polar region, where it exceeds .10 inch, and thence over the east part of the Atlantic Ocean to the British Isles. An increase of pressure is also shown over the southern half of the north American continent, the change being most marked over the middle plateau region and the west part of the southern plateau region, where it is more than .10 inch. Over the oceans, northern and western Europe, and the northern half of the American continent there is a decrease of pressure, the most marked decrease being shown over Bering Sea and the Pacific Ocean east of the Alaska Peninsula, where it is more than .10 inch.

OCTOBER TO NOVEMBER.

The pressure increases over Asia and thence over the polar regions and the American continent, and the area of increase extends from Asia over southern Europe, and from the American continent over southwest and northwest parts of the Atlantic Ocean and the southeast part of the Pacific Ocean. The greatest increase occurs over a great part of Asia, where it exceeds .15 inch, and the increase is more than .10 inch over the polar regions and thence over the interior of British America, over the middle plateau region of the United States, and over western Mexico. The pressure decreases generally over the Atlantic and Pacific oceans, and the area of decrease of pressure over the Atlantic Ocean extends over the northeast part of the United States and northern Europe. The most marked decrease occurs in an area north of the British Isles, where it is more than .15 inch, and the decrease is more than .10 inch in an area extending from the Arctic Ocean north of eastern Siberia southward over the Pacific Ocean west of the Japanese Islands. The decrease is also more than .10 inch over extreme northwest Europe.

NOVEMBER TO DECEMBER.

The pressure increases generally over Asia and North America, except in an area north of British India and from the north Pacific coast over the middle plateau region of the United States. The pressure also increases over the Arctic Ocean north of Alaska, Greenland, and Siberia, Bering Sea, the south part of the Atlantic Ocean, and west-central and southwestern Europe. The greatest increase of pressure occurs in an area extending from British America east of Hudson Bay northwestward over Alaska and the ocean to the northward, and in areas in north-central and southeastern Asia, where it exceeds .10 inch. The pressure decreases generally over Europe, thence over the Arctic Ocean and Greenland to the Hudson Bay region, and southward over the west part of the Atlantic Ocean to the 30th parallel. There is also a decrease of pressure from eastern Siberia and the west part of Bering Sea over and east of the more northern Japanese Islands. The most marked decrease of pressure occurs in an area extending from southern Greenland to Iceland, where it is more than .20 inch, and the decrease is more than .10 inch east of the northern Japanese Islands, over northeastern Europe and Nova Zembla, and over and near Iceland and southern Greenland.

DEPARTURE OF MONTHLY NORMAL PRESSURE FROM ANNUAL NORMAL PRESSURE.

Charts 26 to 37 show the departure of the normal pressure for the several months from the annual normal pressure.

Compared with the annual normal pressure the normal pressure of the winter months is decidedly higher over the continents, and lower over the oceans. Over east-central Asia the January pressure is .40 to .50 inch higher than the annual, and over the interior of British America west of Hudson Bay it is .20 to .30 inch above the annual normal. From the eastern coast of Green-

land over Iceland and Spitzbergen the January values are .25 to .30 inch lower, and over the west part of Bering Sea they are .20 to .25 inch lower than the annual. In February the differences are less marked, and in March the pressure falls below the annual over western and northern Europe and eastern and northwestern parts of the North American continent. In that month the normal is .10 to .20 inch above the annual over Greenland, Iceland, and the Arctic regions north of Siberia. As the spring progresses the pressure decreases over the continents and increases over the oceans, and by May the winter order of distribution is reversed, the monthly normal pressures being above the annual normal over the oceans and below over the continents. The greatest departure above the annual normal pressure is shown over the oceans in June, when the monthly values exceed the annual by .10 to .20 inch in a large area covering the Atlantic Ocean north of the 45th parallel, and over a considerable area extending from the Alaska coast over the northeastern Pacific Ocean to the 45th parallel.

The most marked departure below the annual pressure is shown over the interior of Asia in July, when the monthly values are .40 to .50 inch below the annual, and from the interior of British America northward over the Arctic regions to the Siberian coast the July normal is .20 to .30 inch below the annual. During the summer months the continental areas of low pressure are connected by a trough of low pressure which crosses the polar regions. The first fall month, September, shows pressure below the annual, except in a belt covering Europe and extending thence over the middle and northern latitudes of the Atlantic and the northeast part of the United States, and in areas over the extreme North Pacific Ocean. In October the winter increase of pressure over the continents is shown by pressure above the annual average over Asia and western Europe, the United States and Canada, and pressure below the annual over the Pacific Ocean, the greater part of the Atlantic Ocean, and over British America west of Hudson Bay. In November the pressure is above the annual over the continents, except in northwestern Europe; it is also above the annual generally over the Pacific Ocean, except about the Hawaiian Islands. In that month the pressure is below the annual over the North Atlantic Ocean, except near the American coast and over Iceland. The December chart shows the marked differences between the winter and annual normal pressure. Over the interior of Asia the monthly pressure is more than .30 inch above, and over southwestern Europe and the interior of North America it is .10 to .15 inch above the annual. Over Bering Sea, and from the southern half of Greenland over Scandinavia the monthly values are .10 to .20 inch below the annual normal.

STORMS OF THE NORTHERN HEMISPHERE.

Charts 40 to 51 show, by months, the number of storm-centers traced over each square of five degrees, the average frequency and course of storms over the Northern Hemisphere, and the tracks of tropical storms traced for the period 1878 to 1887, inclusive. Chart 52 exhibits the aggregate number of storms traced for the ten years, and Chart 53 presents the average monthly and seasonal tracks of storms, the tracks of spring, summer, autumn, and winter being shown in green, yellow, red, and blue, respectively.

Prominent characteristics of the storms of the Northern Hemisphere are shown by the following descriptive text and tables:

STORM TRACKS AND STORM FREQUENCY IN THE MIDDLE AND NORTHERN LATITUDES.

The principal track of winter storms over the North American continent is traced eastward from the Pacific to the Atlantic oceans between the 45th and 50th parallels. In that season severe storms, which are, in many instances, secondary developments, advance northeastward from the Western and Southwestern States and the middle and south Atlantic coasts. In January an average of more than five storms per month traverse the Saint Lawrence Valley. This is the greatest number of storms noted for any month in any part of the Northern Hemisphere. Over the North Atlantic Ocean the winter track is traced to mid-ocean north of the 50th parallel, where it divides, one part crossing Iceland and northern Scandinavia and passing thence south of east into Russia, and the other passing southeastward over the Bay of Biscay and the northern Mediterranean and ending near the Black Sea. An average of about four storms per month cross Newfoundland in December and January, and in an area extending thence along the 50th parallel to mid-ocean the average number of storms exceeds two per month. In the vicinity of Newfoundland and the Grand Banks the storms are somewhat less frequent in February. In January and February about two storms per month are traced near and over Iceland. In December more than two storms per month are traced over the North, Baltic, and White seas, Scandinavia, and a part of the Italian Peninsula. In January the number exceeds two per month only over northern Scandinavia, and in February there is no part of Europe in which an average of two, or more, storms per month is shown. The winter storms of the West Pacific generally appear south or southwest of the Japanese Islands and pass northeastward toward Kamchatka. In December and January the average number exceeds two per month over the Japanese Islands near the 40th parallel. The usual course of storms is eastward over Bering Sea, and thence to the North American coast in about latitude north 50°. The storms of the extreme North Pacific are most frequent in December, when the average number in the neighborhood of Sitka, Alaska, is 1.2.

For the spring months the average track of storms over the North American continent is farther south than during the winter season. The principal track is traced eastward between the 40th and 45th parallels. Less frequented tracks are traced from the Southwestern States and the south Atlantic coast. In March the region of greatest storm frequency is shown over the northeastern lake region, where the average is more than four. An average of more than four storms per month is also shown off the New England coast. In April the region of greatest storm frequency over the North American continent occupies an area extending from the middle Missouri Valley over the middle-eastern slope of the Rocky Mountains, where the average number of storms is in excess of three. In May the greatest number of storms, an average of about three, occur in an area covering eastern Ontario and western Quebec. The tracks are also somewhat farther south over the North Atlantic, when compared with those traced for the winter months. In March and April an average of more than three storms per month traverse a small area northeast of the Banks of Newfoundland. In May the greatest number of storms is shown over and north of Scotland, and off the Nova Scotia and New England coasts, where the average number exceeds two. Over Europe the storms of the spring months pass farther south over Scandinavia, and the storm-tracks of southern Europe are traced somewhat farther north than during the winter season. The storms of northern Europe disappear over Russia, and those of southern Europe over or north of the Black Sea. In March an average of about two storms appear over northern Scandinavia and Finland and the Adriatic Sea. In April an average of more than two storms is noted for south-central Europe and the northern Mediterranean. In May the average number exceeds two only over and north of Scotland. The spring storms of the Western Pacific Ocean generally appear south of the Yellow Sea and pass northeastward over the Japanese Islands toward Kamchatka. The storms of that region increase in number during the spring months, and in May the average exceeds two over the greater part of the Japanese Islands. The course of storms over Bering Sea and the extreme Northeast Pacific Ocean is apparently slightly north of the winter track, and their course off the American coast is more southeasterly toward the mouth of the Columbia River.

In the summer season storms seldom cross the western mountain ranges of the North American continent. A large majority of the storms of those months originate on the middle and northeast slopes of the Rocky Mountains, advance toward Lake Superior, and pass thence to the Gulf of Saint Lawrence and Newfoundland. In July and August storms of tropical or sub-tropical origin sometimes pass northeastward along or off the Atlantic coast of the United States. In the Saint Lawrence Valley the number of storms increases from an average of about three in June to nearly five in July, and decreases to about four in August. Over the North Atlantic Ocean the principal track of summer storms is traced from Newfoundland north of east to the 30th meridian, where it divides, one branch passing over and the other north of the British Isles. The storms of the North Atlantic increase in number during July and August, and in the latter-named month exceed two generally along the 50th parallel, and in an area extending from mid-ocean north of Scotland. The principal track of summer storms over Europe is traced eastward over Scandinavia and central Russia. A track is also traced from the North Sea south of east toward the Black Sea. In central and western Europe the storms decrease in number during the summer months, except over the greater part of Scandinavia, where the average number increases to more than two in August. The summer storms of the West Pacific Ocean apparently develop near or east of the Philippine Islands, pass thence to the east China coast, and thence northeastward over the Japan Sea or the Japanese Islands toward Kamchatka. No track of storms is traced over Bering Sea and the extreme Northeastern Pacific Ocean for the summer months. In an area covering the Japanese Islands and the Japan Sea the average number of summer storms is about 1.5, and the storms of that region are somewhat less frequent in July than during June and August.

In autumn the principal storm-track of the North American continent crosses the Pacific coast between the mouth of the Columbia River and the 55th parallel, and east of the 100th meridian passes almost due east between the 45th and 50th parallels. Less frequented tracks are traced from the middle and southern Rocky Mountain regions to the northern Great Lakes, and from the region north of the West Indies northeastward to Newfoundland.

In an area extending from the northern lake region to the lower Saint Lawrence Valley there is an increase in the number of storms traced during the fall months, and in November the average number exceeds five. The principal tracks of autumn storms on the North Atlantic pass north of the British Isles, and follow rather diversified tracks over northern Europe. One branch, however, passes southeastward over the British Isles and eastward over southern Europe, and another from the Bay of Biscay over the northern Mediterranean and the Adriatic seas. The storms of the North Atlantic increase in number from September to November, and in the latter-named month the average number exceeds two generally in a belt extending from Newfoundland to the Norwegian coast. The storms of the fall months are well distributed over Europe, and are more numerous in October, when an average of more than two per month visit Scandinavia and northwestern Russia. In autumn the storms which appear near the Philippine Islands follow two tracks, one westward over the China Sea and the other northeastward over or near the Japanese Islands. A track is also traced for the fall months over Bering Sea and the extreme Northeast Pacific to the American coast north of the mouth of the Columbia River. The storms of the Western Pacific decrease in number as the fall advances, and the average per month is less than two, except over the southern Japanese Islands in September, where there is an average of 2.3.

The chart of aggregate storm-tracks shows that the region of greatest storm frequency in the Northern Hemisphere is included in an area which extends from eastern Lake Superior to the middle Saint Lawrence Valley. In that region the annual number averages about forty-eight. In an area extending from Newfoundland eastward over the North Atlantic Ocean to the 20th meridian the average number of storms per year is more than twenty. Scandinavia and Finland are the regions of greatest storm frequency in Europe, and from the northwest coast of Norway over the Faroe Islands the average number exceeds twenty per year. Over the greater part of the Japanese Islands the annual number of storms varies from fifteen to eighteen. Figures on the chart of aggregate storm-tracks show the total number of storms noted in each square of five degrees. These figures show that the stormiest latitudes are between the 45th and 50th parallels, where the total number is 8,088, and that the number of storms decreases rapidly north and south of those latitudes.

Velocity of Storms (in statute miles per hour) over the Northern Hemisphere.

Districts.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Average.
United States	37	37	33	26	25	25	25	26	26	30	31	36	30
Atlantic Ocean	22	23	22	20	16	16	19	19	19	21	21	21	20
West Indies:													
Before recurve	?	?	?	?	?	25	17	18	16	12	17	?	18
During recurve	?	?	?	8	?	10	10	12	9	9	?	10	10
After recurve	23	?	?	16	?	21	28	23	26	28	?	?	24
Europe	18	18	18	18	18	18	17	18	16	18	19	18	18
Yellow and Japan Seas and Japan	23	24	24	24	24	23	20	20	23	26	26	24	23
Bering Sea	20	17	17	20	20	26	23	20	21	20	21	20	20
Pacific Ocean east of Alaska Peninsula	19	21	17	20	18	20	?	20	20	22	21	19	18
Philippine Islands and China Sea:													
Before recurve	?	?	?	7	9	10	13	10	10	8	16	?	10
During recurve	?	?	?	9	?	10	10	10	11	11	?	?	10
After recurve	?	?	26	23	?	?	17	20	23	23	?	?	22
Mean easterly	23	23	22	21	20	21	21	21	22	23	23	23	22
Mean westerly	23	?	26	19	?	21	22	22	24	25	?	?	23
Mean during recurve	?	?	?	9	?	10	10	11	10	10	?	10	10

Between the meridians of 85° and 100° of west longitude the aggregate number of storms for ten years exceeds 1,200. These figures show that, considered by longitude, the central valleys of the United States include the region of greatest storm frequency in the Northern Hemisphere. .

The table shows that storms of the Northern Hemisphere have an average easterly velocity of 22 miles per hour, and that the average velocity is greatest, 30 miles per hour, over the North American continent, and least, 18 miles per hour, over Europe and the North Pacific Ocean east of the Alaska Peninsula.

The average velocity of storms over the North American continent, 30 miles per hour, is 10 miles per hour greater than the average velocity of North Atlantic storms, and the greatest velocity of ocean storms is shown in connection with storms of tropical origin after the recurve to the eastward.

The average velocity of North American storms is greater, by 12 miles per hour, in winter than during the summer months; over the North Atlantic Ocean, the Yellow and Japan seas, and Japan the difference in velocity is not so marked; and over Bering Sea and the Pacific Ocean east of the Alaska Peninsula the average velocity for the cold and warm months differs but slightly.

The following table shows, by months, the average number of storms that traverse the United States, the North Atlantic Ocean, and Europe:

Section.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Average.
United States	1.8	1.9	1.9	1.3	0.7	0.3	0.6	0.3	0.5	0.6	1.5	1.6	1.1
Atlantic Ocean	2.5	2.6	1.7	1.4	0.8	1.0	1.8	1.4	1.9	1.6	2.4	2.9	1.8
Europe	2.3	1.7	1.7	1.0	1.2	0.1	0.6	1.1	1.0	1.2	1.4	2.0	1.3

This table shows that an average of less than two storms per month traverse the United States, the Atlantic Ocean, and Europe, respectively. The average number is greatest, 1.8, over the Atlantic Ocean, and least, 1.1, over the United States. In all of the sections the winter storms are the longer lived. An average of nearly three per month traverse the Atlantic Ocean in that season, and somewhat less than two per month cross the United States. In the summer and early fall months an average of less than one storm per month traverses the United States, while over the Atlantic Ocean and Europe the average is somewhat greater.

The following table shows the number of storms in each month that traversed successively the North American continent and the Atlantic Ocean during the ten years, 1878 to 1887, inclusive:

January	7	July	1
February	8	August	1
March	5	September	1
April	2	October	1
May	1	November	1
June	0	December	3

The following table shows the number of storms in each month that traversed successively the Atlantic Ocean and Europe during the ten years, 1878 to 1887, inclusive:

January	3	July	1
February	3	August	1
March	2	September	0
April	1	October	1
May	0	November	1
June	0	December	1

The following table shows the number of storms in each month that traversed successively the North American continent, the Atlantic Ocean, and Europe during the ten years, 1878 to 1887, inclusive:

January	2	July	0
February	2	August	0
March	1	September	0
April	0	October	0
May	0	November	0
June	0	December	1

These tables show that the longer-lived storms are confined principally to the colder months, and that storms that originate in the warmer months seldom traverse a track 6,000 miles, or more, in length. The storms that appear on the north Pacific coast of the United States appear to possess the greater vitality. During the ten-year period above noted the storms which originated on the North Pacific during the three winter months and traversed the North American continent and the Atlantic Ocean numbered eighteen. Seven storms traversed the Atlantic Ocean and Europe during those months, and five storms from the Pacific crossed the American continent, the Atlantic Ocean, and Europe. A study of the storms of the Northern Hemisphere shows that the longer-lived storms commonly originate in the higher latitudes. The storms which appear on the Pacific coast north of Washington possess greater vitality than any other class of storms traced over the Northern Hemisphere. Storms of tropical origin are generally short-lived, and those that recurve eastward generally dissipate after reaching the middle latitudes.

The following table shows the total number of West India cyclones, and Philippine Islands and China Sea typhoons traced whose paths had a westerly component during the ten years, 1878 to 1887, inclusive:

West India cyclones.

January	0	August	16
February	0	September	14
March	0	October	17
April	1	November	2
May	0	December	3
June	1		
July	3	Total	57

Typhoons.

January	0	August	17
February	0	September	16
March	0	October	13
April	1	November	11
May	1	December	2
June	1		—
July	10	Total	72

The following shows the general movement during the several months of the West India cyclones with a westerly component traced during the ten years, 1878 to 1887, inclusive:

Movement of West India cyclones.

Month and year.	Appeared.	Recurved.	Disappeared.
April, 1886..	N. 19°, W. 75°, Caribbean Sea	N. 20°, W. 78°, over Cuba	Central Europe.
June, 1886..	17 80 Caribbean Sea	25 89 Gulf of Mexico	Off middle Atlantic coast.
July, 1886..	19 83 Caribbean Sea	25 88 Gulf of Mexico	Middle Atlantic ocean.
Do	25 85 Gulf of Mexico	25 87 Gulf of Mexico	W. of British Islands.
July, 1887..	14 61 Windward Islands	21 89 Yucatan	East Gulf States.
Mean	19 76	23 88	
Aug., 1878..	15 78 Caribbean Sea	No recurve	WNW. to west Gulf.
Aug., 1879..	16 65 Caribbean Sea	N. 20°, W. 78°, Cuba	S. of Newfoundland.
Do	20 90 Yucatan	25 95 Gulf of Mexico	S. of Newfoundland.
Aug., 1880..	15 80 Caribbean Sea	No recurve	WNW. to Texas.
Do	27 69 E. of Bahamas	do	N. of W. to East Gulf States.
Do	18 58 E. of Windward Islands..	N. 21°, W. 79°, Cuba	NE. of Bahamas.
Do	26 61 SE. of Bermuda	32 65 Near Bermuda	N. of Bermuda.
Aug., 1881..	20 63 N. of Windward Islands..	No recurve	WNW. to Mississippi Valley.
Aug., 1883..	22 58 NE. of Windward Islands	N. 33°, W. 70°, W. of Bermuda	NW. of British Islands.
Do	28 68 N. of Windward Islands..	34 70 W. of Bermuda	Mid-ocean.
Aug., 1886..	11 59 E. of Windward Islands..	No recurve	N. of W. to Gulf of Mexico.
Do	26 92 Gulf of Mexico	do	SE. slope Rocky Mountains.
Do	12 59 E. of Windward Islands..	N. 22°, W. 80°, Cuba	S. of Iceland.
Aug., 1887..	21 67 N. of Puerto Rico	28 79 N. of Bahamas	North Sea.
Do	17 58 E. of Windward Islands.	27 79 N. of Bahamas	Mid-ocean.
Do	17 72 Caribbean Sea	No recurve	S. of Cuba.
Mean	19 68	N. 27°, W. 77°	
Sept., 1878..	11 60 E. of Windward Islands..	24 81 Florida	S. of Iceland.
Do	15 71 Caribbean Sea	19 73 N. of Haiti	NE. of Bahamas.
Do	14 49 E. of Windward Islands..	25 60 N. of Windward Islands	North Sea.
Sept., 1879..	15 68 Caribbean Sea	23 87 Gulf of Mexico	Mid-ocean.
Sept., 1881..	25 70 N. of Haiti	33 76 North Carolina coast	New England coast.
Sept., 1882..	21 72 N. of Haiti	25 88 Gulf of Mexico	Near Iceland.
Sept., 1883..	15 66 Caribbean Sea	30 79 S. Atlantic coast	S. of lower lakes.
Sept., 1884..	14 47 E. of Windward Islands..	20 58 NE. Windward Islands	NE. of Windward Islands.
Sept., 1885..	27 56 NE. of Windward Islands	No recurve	South of Nova Scotia.
Do	24 89 N. of Yucatan	N. 25°, W. 93°, Gulf of Mexico	Mid-ocean.
Do	23 97 West Gulf	23 97 West Gulf	NW. of British Islands.
Sept., 1886..	22 66 N. of Puerto Rico	No recurve	W. of Bermuda.
Do	14 62 Windward Islands	N. 22°, W. 97°, Gulf of Mexico	Middle Mississippi Valley.
Sept., 1887..	13 57 E. of Windward Islands..	No recurve	North Mexico.
Mean	18 66	N. 24°, W. 81°	
Oct., 1878..	25 50 NE. of Windward Islands	30 52 NE. of Windward Islands	Mid-ocean.
Do	17 41 NE. of Windward Islands	18 55 NE. of Windward Islands	E. of Bermuda.
Do	25 72 E. of Bahamas	25 73 NE. of Bahamas	North of Europe.
Do	17 81 Caribbean Sea	21 81 Cuba	S. of Newfoundland.
Oct., 1879..	16 71 Caribbean Sea	33 89 Mississippi Valley	Lake region.
Oct., 1880..	25 61 N. of Windward Islands..	30 63 SE. of Bermuda	NE. of Bermuda.
Oct., 1881..	25 60 N. of Windward Islands..	30 63 SE. of Bermuda	Southern Europe.
Oct., 1882..	20 83 Caribbean Sea	23 83 Cuba	Near Iceland.
Oct., 1883..	30 65 S. of Bermuda	No recurve	Westward to S. Atlantic coast
Do	27 79 Bahamas	N. 27°, W. 79°, Bahamas	S. of Iceland.
Oct., 1884..	22 75 N. of W. Cuba	24 76 Bahamas	S. of Newfoundland.
Oct., 1886..	21 84 Caribbean Sea	30 95 West Gulf States	Middle Mississippi Valley.
Do	17 70 Caribbean Sea	19 70 San Domingo	E. of Newfoundland.
Oct., 1887..	19 44 E. of Windward Islands..	20 58 NE. of Windward Islands	Mid-ocean.
Do	17 52 E. of Windward Islands..	25 56 NE. of Windward Islands	S. of Newfoundland.
Do	18 80 Caribbean Sea	No recurve	WNW. to Gulf of Mexico.
Do	15 78 Caribbean Sea	N. 24°, W. 97°, West Gulf	NE. of Iceland.
Mean	20 67	25 73	
Nov., 1878..	13 51 E. of Windward Islands..	No recurve	Westward to Caribbean Sea.
Nov., 1879..	15 68 Caribbean Sea	N. 24°, W. 78°, Bahamas	Mid-ocean.
Mean	14 59		
Dec., 1885..	15 76 Caribbean Sea	18 77 Jamaica	E. of Iceland.
Dec., 1887..	19 54 NE. of Windward Islands	33 62 E. of Bermuda	S. of Iceland.
Do	25 62 N. of Windward Islands..	29 65 S. of Bermuda	E. of Bermuda.
Mean	20 64	27 68	

The following table shows, by months, the number of West India cyclones that appeared, the average position in which they were first located, the average position in which they recurved, and the regions in which they disappeared during the ten years, 1878 to 1887, inclusive:

Number and average position of West India cyclones.

Month.	No. of cyclones.	Appeared. Lat. N.	Appeared. Long. W.	Recurved. Lat. N.	Recurved. Long. W.	Disappeared.
		°	°	°	°	
April	1	19	75	20	78	Over Europe.
June	1	17	80	25	89	Off middle Atlantic coast.
July	3	19	76	23	88	Over mid-ocean.
August	16	19	68	27	77	7 no recurve; 4 over mid-ocean; 2 south of Newfoundland; 2 north of West Indies; 1 traversed ocean.
September	14	18	66	24	81	4 over mid-ocean; 3 no recurve; 1 north of West Indies; 1 off New England coast; 1 south of lower lakes; 1 northeast of Windward Islands; 1 south of Nova Scotia; 1 in Mississippi Valley; 1 traversed ocean.
October	17	20	67	25	73	3 south of Newfoundland; 3 traversed ocean; 2 north of West Indies; 2 no recurve; 2 over United States; 5 over mid-ocean.
November	2	14	59	24	78	1 over mid-ocean, 1 no recurve.
December	3	20	64	27	68	2 over mid-ocean, 1 east of Bermuda.

The above table shows that forty-four of the fifty-seven West India cyclones traced had a recurve to the northward; that during the three principal cyclone months, August to October, inclusive, the storms generally recurved east of the Gulf of Mexico; that in August and October the average recurve was over or somewhat to the eastward of the Bahama Islands; and that in September the average recurve was in the longitude of eastern Florida. The figures represent merely an average, however, and many of the cyclones of these months recurved far to the eastward of the Bahamas and others over the Gulf of Mexico. Again, a number of the more energetic and destructive storms had no recurve and advanced westward over the Gulf of Mexico. Eighteen of the storms traced with a recurve disappeared over the Atlantic Ocean before reaching the European coast, fifteen disappeared between the West Indies and Newfoundland, six traversed the North Atlantic Ocean and reached Europe, and five dissipated over the United States.

The recurve of storms in the West India and Gulf of Mexico regions is dependent upon the general meteorological conditions, and more especially upon the distribution of atmospheric pressure. The anticyclonic or high pressure area of the North Atlantic Ocean lies northeast of the West Indies and causes easterly winds over the southern part of the ocean and the Caribbean Sea. The storms that develop in the region east of the West Indies, and also those of a more western origin, have a tendency to follow the course of the main equatorial current over the Caribbean Sea. This course is doubtless largely influenced by the general drift of the atmosphere in that region, and following the anticyclonic circulation of winds the cyclones skirt the western quadrants of the Atlantic high area and follow the course of the Gulf Stream to the middle latitudes. As thirty-nine of the fifty-six storms traced followed this general course it may be considered the usual course of West India cyclones when the usual meteorological conditions obtain over the west-central North Atlantic Ocean and the eastern part of the United States. As before stated some of the more important storms that originate near the West Indies do not recurve to the northward, but move westward over the Gulf of Mexico and dissipate over Mexico and the Southwest. In such cases high pressure will be found to the northward, whereby the recurve is apparently prevented.

Observation has shown that when the advance of a storm of pronounced strength is obstructed and it is forced or held back by an area of high pressure which persistently occupies the region through which the storm would pass with the prevalence of usual conditions, the storm acquires destructive energy before filling up or dissipating. Among notable storms of this class may be mentioned the cyclone of August, 1886, which totally destroyed the city of Indianola, Tex., and the cyclone of September, 1888, which raged with destructive violence over Cuba. These storms were apparently unable to recurve, owing to the high pressure obstruction to the northward. Forced westward, they developed intense energy, and dissipated, one on the southeast slope of the Rocky Mountains and the other over eastern Mexico. An almost entire absence of reports from the region east of the Windward Islands prevented the tracing of storms to their place of origin. It is supposed that storms which advance from east of the Caribbean Sea develop in the region of equatorial rains and are carried thence eastward by the prevailing wind currents. A reference to the tabulated list of storms traced from that region will show that during the period 1878 to 1887, inclusive, no West India storms were traced south of the 10th parallel, and that the southernmost position occupied by a West India cyclone center was north 10°, in west 44°, in October, 1887. The tracks of West India cyclones traced for the ten years 1878 to 1887, inclusive, are shown on the storm track charts published herewith.

The following table shows the general movement, during the several months, of typhoons of the Philippine Islands and the China Sea having a westerly component traced during the ten years, 1878 to 1887, inclusive:

General movement of Philippine Islands and China Sea typhoons.

Month and year.	Appeared.	Recurved.	Disappeared.
Apr., 1879	N. 14°, E. 133°	N. 17°, E. 126°, E. Philippine Islands	South of Japan Islands.
May, 1881	12 126	16 108 SW. Island of Hainan	South of Island of Hainan.
June, 1881	11 126	22 116 China Sea	East coast of China.
July, 1880	8 120	No recurve	West of Island of Hainan.
July, 1881	20 126	N. 20°, E. 126°	South of Japan Islands.
Do	9 128	30 121 E. China coast	Yellow Sea
Do	10 122	No recurve	West of Island of Hainan.
July, 1882	10 116	N. 25°, E. 105°, W. China Sea	Japan Sea.
July, 1883	17 121*	No recurve	North of Island of Hainan
July, 1884	21 122	N. 22°, E. 105°, China	Over southwest China.
Do	17 124	17 118 China Sea	Japan Sea.
Do	24 125	No recurve	West of Island of Hainan.
July, 1886	13 123†	do	Eastern China Sea.
Mean	15 124	N. 23°, E. 115°	
Aug., 1880	14 125	No recurve	West of Island of Hainan.
Do	17 131	do	Southwest of Island of Hainan.
Do	22 125	N. 22°, E. 125°	Japan Sea.
Do	20 141	38 124 Yellow Sea	North of Yellow Sea.
Aug., 1881	13 126	No recurve	Southern China.
Do	18 128	N. 24°, E. 121°, Formosa	Yellow Sea.
Do	27 133	No recurve	Southern China.
Aug., 1882	18 124	N. 30°, E. 126°, China	North of Japan Sea.
Do	30 130	35 127 Corea	Japan Sea.
Aug., 1883	18 113	18 113 China Sea	South of Japan.
Do	30 150	35 147 E. of Japan	East of Japan.
Aug., 1884	16 124	20 115 China Sea	Japan Sea.
Aug., 1885	23 117	No recurve	Southeastern China.
Do	27 125	do	Eastern China.
Aug., 1886	14 119	do	South of Island of Hainan.
Do	23 142	N. 32°, E. 115°, E. China	Northeastern China.
Do	28 132	35 130 Japan Sea	East of Japan.
Mean	21 128	29 124	
Sept., 1878	17 132	19 124 East of China	Bering Sea.
Sept., 1880	12 126	No recurve	West of Island of Hainan.
Do	17 125	do	Southwest of Island of Hainan.
Do	20 127	do	West of Island of Hainan.
Do	20 125	N. 25°, E. 122°, Formosa	Japan Sea.
Sept., 1881	20 118	23 119 China coast	East of Japan.
Do	16 124	23 122 E. Formosa	North of Japan.
Do	17 124	29 123 China	Yellow Sea.
Do	28 127	do	East of Japan.
Do	33 141	do	Do.
Sept., 1882	14 126	24 122 Formosa	Northeast of Japan.
Do	19 124	S. of Japan 6 days	East of Japan.
Sept., 1884	19 127	N. 23°, E. 113°, China	Bering Sea.
Do	20 125	23 121 Formosa	North of Japan.
Sept., 1886	19 120	No recurve	Southeastern China.
Sept., 1887	22 122	do	South China coast.
Mean	20 126	N. 25°, E. 123°	
Oct., 1878	20 121	No recurve	Island of Hainan.
Do	25 132	N. 23°, E. 127°, Yellow Sea	Bering Sea.
Oct., 1880	10 119	14 117 China Sea	Near Formosa.
Do	18 125	No recurve	West of Island of Hainan.
Do	27 130	N. 27°, E. 130°	East of Japan.

General movement of Philippine Islands and China Sea typhoons—Continued.

Month and year.	Appeared.	Recurved.	Disappeared.
Oct., 1881	N. 13°, E. 123°	N. 24°, E. 105°, China	East of Japan.
Do	14 126	22 108 China	Do.
Do	19 121	23 114 China	Do.
Oct., 1882	13 129	No recurve	Southeast of Anam.
Oct., 1886	12 125	do	South of Island of Hainan.
Do	17 127	do	West of Island of Hainan.
Do	21 133	N. 28°, E. 132°, S. of Japan	East of Japan.
Oct., 1887	22 121	23 121 Formosa	South of Japan.
Mean	18 126	23 122	
Nov., 1878	24 139	32 132 Japan	Bering Sea.
Nov., 1880	10 117	No recurve	South of Siam, North 8°.
Nov., 1881	8 127	do	West coast of Anam.
Do	10 126	do	South of Siam, North 9°.
Do	18 123	N. 22°, E. 121°, Formosa	Japan Sea.
Do	24 122	33 103 China	Do.
Nov., 1882	14 129	24 111 China Sea	Southeast of Japan.
Nov., 1883	13 123	No recurve	China Sea.
Nov., 1884	16 124	do	Do.
Nov., 1885	13 121	do	Do.
Nov., 1886	13 122	N. 24°, E. 121°, Formosa	South of Japan.
Mean	16 125	27 118	
Dec., 1882	11 125	No recurve	Near Formosa.
Dec., 1886	9 126	N. 15°, E. 112°, China Sea	South of Formosa.

* Luzon. † Philippine Islands.

The following table shows, by months, the number of typhoons that appeared near the Philippine Islands and over the China Sea, the average position in which they were first located, the average position in which they recurved, and the region in which they disappeared during the ten years, 1878 to 1887, inclusive:

Number and average position of Philippine Islands and China Sea typhoons.

Month.	No. of typhoons.	Appeared. Lat. N.	Appeared. Long. E.	Recurved. Lat. N.	Recurved. Long. E.	Disappeared.
		°	°	°	°	
April	1	14	133	17	126	South of Japan.
May	1	12	126	16	108	Near Island of Hainan.
June	1	11	126	22	116	East of the China coast.
July	10	15	124	23	115	5 no recurve; 1 south of Japan; 1 Yellow Sea; 2 Japan Sea; 1 over southwest China.
August	17	21	128	29	124	7 no recurve; 4 Japan Sea; 2 Yellow Sea; 1 south of Japan; 2 east of Japan; 1 over northeast China.
September	16	20	126	25	123	5 no recurve; 2 Bering Sea; 1 Japan Sea; 5 east of Japan; 2 north of Japan; 1 Yellow Sea.
October	13	18	126	23	122	5 no recurve; 1 Bering Sea; 1 near Formosa; 5 east of Japan; 1 south of Japan.
November	11	16	125	27	118	6 no recurve; 1 Bering Sea; 2 Japan Sea; 2 south of Japan.
December	2	10	125	15	112	Near Formosa.

The above tables show that forty-three of the seventy-two typhoons traced had a recurve; that the typhoon season extends from July to November, inclusive; and that these storms are more frequent in August and September. After July the average position in which the typhoons were first located changed to the westward and southward, from N. 21°, E. 128°, in August to N. 15°, E. 124°, in November. The average recurve was also farther west, changing from N. 29°, E. 124°, in August to N. 27°, E. 118°, in November. Of the twenty-nine storms that did not recurve in the region of observation fourteen disappeared near the Island of Hainan, in the China Sea, two disappeared south of Siam, south of the 10th parallel, and the balance of the storms disappeared over southern China and the China Sea. Of the forty-three storms that recurved twenty-nine disappeared over the Japan Sea and Japan, seven over China and the Yellow Sea, four reached Bering Sea, two disappeared near Formosa, and one near the Island of Hainan. Four of the typhoons were first located south of the 10th parallel, and two, one in July, 1880, and the other in November, 1881, were located as far south as the 8th parallel. Compared with the West India cyclones the typhoons originate farther south and pursue a more northerly course before recurving; they recurve in about the same latitude; and, so far as reports show, a larger proportion have no recurve.

STORMS OF THE BAY OF BENGAL.

In the "Hand-Book of Cyclonic Storms in the Bay of Bengal," John Eliot, M. A., Meteorological Reporter to the Government of India, gives the following general conclusions drawn from a study of the storms of that region for the years 1877 to 1887, inclusive:

"It may be accepted as a general principle that the lowest latitude in the Bay at which cyclonic storms are formed or met with is latitude 8° north.

"It may be assumed that storms may occur at any time during the period May to November, and under exceptional circumstances in April and December.

"All cyclonic storms in the Bay of Bengal originate or are produced in the Bay itself.

"It may be laid down as a rule that cyclones or cyclonic storms can originate in or advance over any part of the Bay to the north of latitude 8° north, near the coast, or in the center of the Bay, or the Gulf of Martaban during the months of April to December."

April.

"Cyclonic storms are of comparatively rare occurrence in the Bay of Bengal in April. They form either in the south of the Bay or in the Andaman Sea. Those which form in the Bay proper are generated to the west of the Nicobars or Andamans, and march (in at least three cases out of four) in a west or west-northwest direction to the Ceylon or Coromandel coast. Those which originate in the Andaman Sea march northward to the Lower Pegu coast. Storms are somewhat less probable in this month in the Andaman Sea than in the Bay of Bengal."

May.

"Data establishes the fact that cyclonic storms are of comparatively frequent occurrence in the Bay during May (about two every three years). If they originate in the first fortnight of the month the chances are about three to one they will march in a westerly direction to the Coromandel coast; but if during the latter half of the month, the chances are four or five to one they will march northward to the head of the Bay. It is also about an even chance that a storm forming in this month will be of great intensity (*i. e.*, a cyclone)."

June.

"Cyclonic storms are of frequent occurrence in the north of the Bay in June. They usually form to the north of latitude 20° north, or quite at the head of the Bay. One or two such storms may be expected every year. It is an even chance whether a cyclonic storm which has formed in the Bay in June will pass in some northerly direction into Bengal or in some westerly direction across Orissa. The chief feature of the June cyclonic storms is the strong westerly or southwesterly winds or gales in their southern quadrants. It should also be noted that two out of three advance across the northwest angle of the Bay immediately to the south of the entrance to the Hooghly, and hence, if severe, they are very trying to shipping leaving the Hooghly at such times."

July.

"In July storms only occur in the north of the Bay. They are of comparatively frequent occurrence, an average of two or three occurring in every year. They usually march in a west or north-northwest direction across the northwest angle of the Bay to the Orissa coast. The chances of a storm forming at this time marching in this direction are at least ten to one. They are frequently feeble, but in about one case out of three they give rise to strong westerly and southwesterly gales at the head of the Bay, in which the force of the wind exceeds 8. As they almost invariably cross the northwest angle of the Bay, and hence advance across the track of vessels leaving the Hooghly, outward bound vessels should not leave the river Hooghly when the storm signals are hoisted, unless fully prepared to encounter a severe storm of this kind, and should remain in the river until the lowering of the signals has indicated that the storm has passed landwards."

August.

"Cyclonic storms are almost of as frequent occurrence in August as in July. Five out of every six form to the north of latitude 20°. The chief feature of the storms of August as in July is strong westerly and southwesterly gales at the head of the Bay, and the shift of wind is rarely large enough to indicate their cyclonic character except in the northwest angle of the Bay. The storms of the month occasionally advance northward across the Bengal coast, but more frequently in a west or west-northwest direction across the Orissa or Ganjam coast. The chances, based on previous experience, that a storm which forms in the month will advance in a westerly direction are two to one, and that it will advance north into Bengal are one to two. As the great majority of these storms advance across the track of vessels leaving the Hooghly, captains of vessels about to proceed to sea from Calcutta at a time when the storm signals are hoisted should, unless they are prepared to encounter strong winds and a very heavy sea, if possible, remain in the river until the storm has advanced landwards."

September.

"Cyclonic storms are as frequent in the Bay during September as in July and August, an average of two occurring every year. These cyclonic storms, however, as a rule, form farther south than in the previous two months, but usually to the north of latitude 17°. The chances are four to one that the center of a storm which forms in September will advance in a westerly direction to the northwest coast between Balasore and Coconada. About one storm out of five advances in a northerly direction into Bengal. The great majority of these storms are of small intensity, and resemble the storms of July and August in general character, and in strength of the westerly and southwesterly winds (as compared with the northeasterly and northerly winds) in the south and east quadrants. Under exceptional conditions, the chief of which appears to be the earlier retreat of the southwest monsoon than usual from northern India, these storms are of great intensity and violence, and accompanied by hurricane winds. Hence, cyclones are of occasional occurrence in September (and are most probable in the last fortnight). They form in the center of the Bay, and the chances are about even that when such a storm has formed in the Bay in September it will advance in a northwest direction to the Bengal coast or in a westerly direction to the coast of the Circars."

October.

"Cyclonic storms occur less frequently in the Bay in October than during any of the four preceding months. They are of very rare occurrence in the Andaman Sea, and rarely, if ever, form to the north of latitude 20° north in the Bay of Bengal. They may originate in any other part of the Bay, but form most frequently in the center of the Bay between the Andamans and the coast of the Circars. If a storm forms in this month the chances are probably about one to two that it will develop into a severe cyclone. The chances are about even that a storm generated in this month will advance westward to the coast of the Circars, and, if it does so, the chances are also about even that it is a feeble or a severe storm, or, in other words, a cyclonic storm or a cyclone. The chances are about one to three that if a storm forms in this month it will advance northward to Bengal or Orissa, and, if it does, the chances that it will be a severe storm or a cyclone are at least two to one. The chances that if a storm forms it will advance to the Madras coast are also about one to three, but, if it does, the chances that it will be a severe storm are probably about even."

November.

"Cyclones may form in any part of the Bay and Andaman Sea to the south of latitude 16° north in the month of November. Two out of three storms which originate in this month form in, or to the south of, latitude 12° north. At least one storm may be expected every year in this month. The chances that a storm in November will be a cyclone are about two to one. If a storm forms, the chances that it will advance to the Coromandel coast are about two to one. About one storm out of three that form advances to the coast of East Bengal or Arakan. The part of the Bay that is most free from cyclonic storms in this month is the northwest angle of the Bay, and the coast from Saugor Island to Vizagapatam. On the other hand, the northeast coast of the Bay is more liable to cyclones in this month than in any other month of the year."

December.

"Storms are of comparatively rare occurrence in the month of December, and no storm is known to have formed in the Bay during the present century after the 15th of the month. No storm has been known to form in the Andaman Sea in this month. Storms occasionally form in the south or southwest of the Bay of Bengal between the Ceylon coast and the Andamans. The chances are nearly two to one that if a storm occurs in this month it will be a violent cyclone. It is also almost a certainty that a storm which forms in this month will advance in a west-northwest direction to the Coromandel coast between Madras and Negapatam. Hence, they are chiefly dangerous in the area between the East Ceylon coast and the Coromandel coast."

STORMS OF THE ARABIAN SEA.

The following information relative to storms of the Arabian Sea is from "Cyclone Memoirs," Part IV, prepared by W. L. Dallas, Esq., Assistant Meteorological Reporter to the Government of India, under the direction of John Eliot, M. A., Meteorological Reporter to the Government of India:

Storms of the Arabian Sea.

Date.	Details of storm.	Coasts affected.
May 21 to 26, 1879	Cyclone from Bay crossed Peninsula to Karwar, then northward to Bhuj.	North and south Konkan and Kattiawar.
May 27 to June 3, 1881	Violent cyclone, Arabian Sea, moving from east to west.	None.
May 30 to June 3, 1885	Aden cyclone traveled from about longitude 62° E. and latitude 13° N. to Gulf of Aden.	South Arabian coast.
May 24 to 28, 1886	Cyclone over center of Arabian Sea.	None.
June 8 to 13, 1885	Cyclone, Arabian Sea, traveled from latitude 15° N., longitude 70° E., to entrance Persian Gulf.	Konkan, Sind, and Mekran coasts.
June 4 to 13, 1887	Cyclone, Arabian Sea, began in latitude 17° N., longitude 72° E., traveled west-northwest to latitude 19° N., longitude 60° E.	South Arabian coast.
June 2 to 8, 1889	Cyclone traveled northward along west coast.	West coast (whole).
July 3 and 4, 1883	Cyclone from Bay crossed Cutch coast on evening of the 3d, felt in latitude 24° N., longitude 63° 30′ E.	Cutch and Kattiawar.
October 16 to 18, 1884	Cyclone passed from Bay of Bengal to Calicut.	Malabar.
October 11 to 13, 1887	Cyclone crossed from Bay to west coast near Goa, passed northward close to coast, and then moved northeastward into Khandeish.	North and south Konkan.
November 21 to 23, 1880	Cyclone from Bay crossed to Calicut, encountered in Arabian Sea in latitude 17° N., longitude 66° E.	Malabar.
November 10 to 15, 1886	Cyclone from Bay crossed Peninsula, the center, when over the Arabian Sea, traveling first to northwest, then to north, and finally to northeast.	Konkan and Mekran coasts.
November 4 to 10, 1888	Small cyclone advanced northeastward from latitude 15° N. and longitude 68° E. to Kattiawar (Vaitarna).	Cutch and Kattiawar coasts.

PRESSURE DISTRIBUTION FOR MONTHS OF MARKED DEPARTURE FROM THE NORMAL TEMPERATURE.

Charts 54 to 57 give lines of monthly mean pressure over the Northern Hemisphere for winter and summer months during which marked variations from the normal temperature were shown over large areas of the United States. Lines of normal pressure for the respective months are also shown.

Chart 54 presents lines of normal pressure for January, and monthly mean pressure for January, 1880. The month of January, 1880, was the warmest January on record in districts in the United States east of the Rocky Mountains. In the Pacific coast districts and thence over the middle plateau region the mean temperature for January, 1880, was unusually low. The distribution of pressure over the United States for that month was very abnormal. Over the northeastern part of the country the mean pressure was .10 to .15 inch above the normal. In the central valleys and the northwestern districts the pressure was below the normal, the most marked deficiency being shown in the upper Mississippi and lower Missouri valleys, where the mean readings were .18 to .20 inch below the normal. Over the North Atlantic Ocean the only noticeable departure from the normal pressure is shown in the Iceland low area, where the monthly mean values were about .10 inch above the normal. The mean pressure was .20 to .30 inch above the normal over southwestern Europe, and was .10 inch above the normal within the Asiatic area of high pressure. In the preceding month, December, 1879, the mean pressure was below the normal over eastern, northeastern, and north-central districts of the United States, the departure in New England being .10 to .20 inch, and the pressure was below the normal in the Rocky Mountain districts, where the departure was .10 to .20 inch.

Lines of normal pressure for January and monthly mean pressure for January, 1886, are shown on Chart 55. January, 1886, was exceptionally cold from the middle Atlantic and Carolina coasts to the southeast slope of the Rocky Mountains. Along the Pacific coast the month was somewhat warmer than usual. For that month the mean pressure was below the normal over the United States, except in northern districts between the Lake region and the Rocky Mountains, where the departure was about .10 inch above the normal. The departure below the normal was more than .10 inch over the middle and south Atlantic States and Florida, and was .10 to .15 inch below the normal over the northern Pacific coast States. Over the North Atlantic Ocean the mean pressure was .20 to .30 inch above the normal in the vicinity of the Azores, and was .20 to .30 inch below the normal in an area covering the ocean between Scotland and Iceland. The mean pressure was .20 to .30 inch below the normal over southern Europe and Algeria, and was about .10 inch below the normal over the greater part of Asia. Over Bering Sea the pressure was .10 to .20 inch higher than usual. For the preceding month the mean pressure in the United States was above the normal in States bordering on the Gulf of Mexico, on the middle and southeast slopes of the Rocky Mountains, and along the Pacific coast, the departure being generally less than .10 inch. Over northern districts east of Washington, and over central districts east of the Rocky Mountain slope, the mean pressure for December, 1885, was below the normal, the most marked departure being shown in New England and in parts of the lower lake region and the middle Atlantic States, where the mean pressure was .10 to .12 inch below the normal.

Chart 56 shows the distribution of normal pressure for August and the mean pressure for August, 1881, over the Northern Hemisphere. In that month the highest mean temperature on record for August was noted over the interior of the United States east of the Rocky Mountains. West of the Rocky Mountains the mean temperature was generally below the normal. The variations from the normal pressure over the United States and the North Atlantic Ocean were slight, the most marked departure appearing on the middle Pacific coast and over the upper lake region, where the mean pressure was about .08 inch above the normal. Over northern Europe the mean pressure was .10 to .20 inch below the normal. The Asiatic pressure was about normal over the southern districts, while over Siberia the mean was about .20 inch below the normal. For the preceding month, July, 1881, the mean pressure was slightly below the average over eastern and southeastern parts of the United States, and was generally somewhat above the normal over interior and western districts.

The normal pressure for August and the mean pressure for August, 1885, are shown on Chart 57. The lowest temperature on record for August was noted from northern New England over the Lake region, the upper Mississippi Valley, and the extreme northwest in 1885. Over southwestern districts and parts of the plateau and Pacific coast regions the mean temperature was above the normal. In that month the mean pressure was below the normal in the United States, except in the plateau and middle and northern Rocky Mountain regions and the Dakotas, the departures below the normal being generally less than .10 inch. Over the North Atlantic Ocean the mean pressure was .10 inch below the normal in southern latitudes, and .20 to .30 inch above the normal in high latitudes. The Asiatic and European pressures differed slightly from the normal, except over northwestern Europe, where the mean readings were .10 to .20 inch higher than usual. In the preceding month, July, 1885, there were no marked departures from the normal pressure over the United States.

Charts 58 to 61 exhibit the distribution of pressure over the Northern Hemisphere for winter and summer months during which marked variations from the normal temperature were noted over large areas of Europe. The normal pressure for the respective months is also shown.

Chart 58 presents normal pressure for January and mean pressure for January, 1884. In that month the mean temperature was 4° to 7° above the normal in central and west-central Europe, and was slightly below the normal in Italy. The mean pressure was .10 to .20 inch above the normal over southwestern Europe, and was about .20 inch below the normal over northwestern Europe and the adjacent ocean. Within the Asiatic high area the pressure was about .10 inch lower than usual. Over the southern portion of the North Atlantic Ocean the mean pressure was about normal. Over interior parts of the North American continent the mean pressure was above the normal, the excess being more than .10 inch over a large area between the Mississippi River and the Rocky Mountains. For the preceding month, December, 1883, the mean pressure was generally above the normal over Europe, except over Austro-Hungary and Denmark, where the normal values obtained. The greatest departure above the normal appeared over the British Isles, where the mean pressure was .20 to .30 inch higher than usual, and the departure above the normal averaged about .15 inch over France.

Chart 59 shows normal pressure for January and mean pressure for January, 1882. The month of January, 1882, was exceptionally warm over central, west-central, and northwestern Europe, and the mean temperature was below the normal only in Spain and Italy. The mean pressure was below the normal in eastern and extreme northern Europe, and was .30 to .40 inch above the normal over southwestern Europe. Within the Asiatic high area the mean pressure was .30 to .40 inch below the normal, while over southeastern Asia the mean values were .10 to .20 inch above the normal. Over the North American continent and the middle and southern latitudes of the North Atlantic Ocean the mean pressure corresponded closely with the normal.

Normal pressure for July and mean pressure for July, 1882, are shown on Chart 60. In July, 1882, the mean temperature was unusually low over southwestern Europe, and a corresponding excess in temperature was noted over eastern and northeastern Europe. In that month the mean pressure over Europe differed slightly from the normal, except over the northern part of the British Isles, where it was about .10 inch lower than usual. Over Asia the pressure corresponded closely with the normal, but was somewhat lower than usual over Siberia. Over the American continent about the normal pressure obtained. Over the southern latitudes of the North Atlantic Ocean the mean pressure was .10 to .20 inch above the normal, while in the high latitudes the mean pressure was somewhat lower than usual. For the preceding month, June, 1882, the European pressures differed slightly from the normal.

Chart 61 shows normal pressure for August and mean pressure for August, 1885. In that month the mean temperature was 4° to 7° below the normal over northwestern Europe, and mean readings above the normal were shown only over Italy. The mean pressure was .10 to .15 inch above the normal over northwestern Europe, and was slightly below the normal over southern Europe. About the normal pressure was noted over Asia and the North American continent. Over southern latitudes of the North Atlantic Ocean the mean pressure was .10 inch lower than usual, while in the northern latitudes it was .20 to .30 inch above the normal. In the preceding month, July, 1885, the mean pressure was .20 to .30 inch above the normal over northwestern Europe, and was above the normal over the entire continent, except over the extreme southwest part, where the normal pressure obtained.

OCEAN FOG.

The following table shows, by months, the average number of dates of fog along the trans-Atlantic steamship routes west of the 40th meridian, as shown by reports of shipmasters for four years:

Average number of dates of fog.

Month.	East of 55°.	55° to 65°.	West of 65°.	Month.	East of 55°.	55° to 65°.	West of 65°.
January	5	9	7	August	22	11	9
February	11	6	5	September	15	6	7
March	12	8	5	October	13	3	2
April	15	10	10	November	10	3	5
May	18	14	17	December	4	5	7
June	17	13	14				
July	23	14	9	Total average	165	102	97

This table shows that over and near the Banks of Newfoundland fog occurs most frequently in July and August, when it is noted on an average of twenty-three and twenty-two days, respectively, and that in December and January the days of fog number but four and five, respectively. Between the 55th and 65th meridians fog occurs most frequently in the late spring and summer months, the greatest average number, fourteen, being noted in May and July, and the least number, three, is shown for October and November. West of the 65th meridian the month of greatest fog frequency is May, the average number of foggy days for that month being seventeen, and the month of minimum fog frequency is October, when the average number of foggy days is but two.

As shown by summaries and statements in the Monthly Weather Review during the last four years the development of fog along and near the trans-Atlantic steamship routes west of the 40th meridian bears a definite relation to the areas of low barometric pressure or general storms that advance eastward from the American continent. The fogs of the banks of Newfoundland are apparently due to the precipitation of aqueous vapor contained in warm air from over the Gulf Stream, which is drawn over the cold surface of the Arctic current and ice fields by southerly winds of the eastern quadrants of areas of low pressure. The more frequent occurrence of fog near Newfoundland during the spring and summer months is in part attributed to the presence in that locality during those seasons of the extensive fields of Arctic ice which commence to drift southward in the Labrador current during the early spring months. As the season advances the ice massed along the Labrador and more northern coasts breaks away in larger quantities, and during the late spring and

early summer months there is an immense accumulation of field ice and icebergs off Newfoundland and over the Grand Banks. The gradual decrease in the quantity of ice in that region is attended by a diminution in fog frequency until November, December, and January, when the southward movement of Arctic ice has ceased. Between the 55th and 65th meridians the season of greatest fog frequency extends from May to July. In this region fog is generally encountered with east to south winds, occasioned by the approach or passage to the northward of areas of low barometric pressure, and its development apparently depends largely upon the difference in temperature between the warm, moist air drawn from over the Gulf Stream and that which overlies Sable Island Bank, where the deep-flowing cold water of the Arctic current is forced to the surface. West of the 65th meridian the months of greatest fog frequency are May and June. In this, as in the fog districts to the eastward, the apparent cause of fog is the meeting of masses of warm, vapor-laden air drawn from over the Gulf Stream by the cyclonic circulation of winds and the colder air which overlies the waters on Georges and Nantucket Shoals, where, as over Sable Island Bank, is found a similar forcing to the surface of the cold, deep-flowing waters of the Arctic current. The more frequent prevalence of fog in the warmer months is attributed, not to absolute differences in temperature during the summer months, which are less than those which exist in winter, but to the greater capacity of sea air for moisture, and to the fact that it is more nearly saturated with moisture in the summer season and thereby rendered more susceptible to the influence of the colder air which it encounters over the Grand Banks and the cold coast current.

ARCTIC ICE NEAR NEWFOUNDLAND AND THE GRAND BANKS.

The following table shows, by months, the average southern and eastern limits of Arctic ice near Newfoundland and the Grand Banks, as determined from reports for nine years, 1883 to 1891, inclusive; also the extreme southern and eastern positions in which Arctic ice was reported during that period:

Average limits of Arctic ice.

Month.	Average southern limit.		Average eastern limit.		Extreme southern position.			Extreme eastern position.		
	Lat. N.	Long. W.	Lat. N.	Long. W.	Lat. N.	Long. W.	Year.	Lat. N.	Long. W.	Year.
	° ′	° ′	° ′	° ′	° ′	° ′		° ′	° ′	
January[1]	....	....	....	....	....	....	....	....	....	....
February	43 07	48 57	46 07	43 31	40 00	48 00	1887	44 30	35 30	1890
March	41 48	50 36	46 38	44 31	40 20	49 02	1886	46 40	39 50	1890
April	41 13	49 32	46 48	40 41	40 00	49 40	1890	47 26[5]	35 42	1890
May	41 06	49 04	44 48	42 58	39 38	46 00	1887	44 12[6]	36 25	1890
June	40 58	49 27	45 41	41 29	39 38	48 12	1885	46 08[7]	37 07	1890
July	43 45	49 19	48 00	42 59	41 25	47 30	1890	45 52[8]	34 30	1886
August	45 01	50 25	49 06	44 39	42 21	49 51	1887	50 13	39 10	1890
September	47 08	49 33	49 20	47 20	45 30[4]	48 00	1890	45 37	40 50	1887
October	46 09	49 56	47 16	48 33	41 34	49 43	1886	47 56	45 45	1890
November[2]	....	....	....	....	....	....	....	....	....	....
December[3]	....	....	....	....	....	....	....	....	....	....

[1] In January, 1883 to 1888, inclusive, Arctic ice in small quantities was reported east of Newfoundland, but in no case was it reported south of the 45th parallel. In 1889 no ice was reported. In 1890 vast fields of ice and enormous icebergs were reported over and near the Banks of Newfoundland north of the 43d parallel. In 1891 three large icebergs were reported in N. 46° 30′, W. 52° 46′, and patches of soft ice were reported in N. 45° 50′, W. 59° 20′.

[2] In November, 1883, 1887, and 1888, no Arctic ice was reported. In 1884 icebergs were reported in N. 45° 56′, W. 52° 38′. In 1885 an iceberg was reported in N. 48° 00′, W. 51° 10′. In 1886 an iceberg was reported in N. 45° 20′, W. 45° 26′. In 1889 ice was reported on the east edge of the Grand Banks and about Belle Isle. In 1890 a small piece of ice was reported in N. 46° 35′, W. 47° 51′. In 1891 an iceberg was reported in N. 51° 58′, W. 55° 35′.

[3] In December, 1883, 1884, 1886, 1888, and 1891, no Arctic ice was reported. In 1885 several icebergs were reported off the Newfoundland coast. In 1887 two icebergs were reported on the northeast edge of the Grand Banks. In 1889 ice in considerable quantities was reported on the northeast edge of the Grand Banks and off southeastern Newfoundland. In 1890 a large iceberg was reported in N. 49° 39′, W. 47° 50′.

[4] On September 4, 1890, a large lump of ice, 100 feet long and 6 feet above water, was reported in N. 36° 49′, W. 42° 18′; this is the lowest latitude in which ice was ever reported in the North Atlantic Ocean.

[5] In 1886 an isolated berg was reported in N. 47° 43′, W. 30° 11′.

[6] In 1891 three small pieces of ice were reported in N. 49° 03′, W. 33° 40′.

[7] In 1890 a small block of ice was reported in N. 46° 28′, W. 28° 34′.

[8] In July, 1891, a small piece of ice was reported in N. 48° 33′, W. 24° 11′.

The above table and statements show that the southward movement of Arctic ice over the Banks of Newfoundland generally continues from February to October, inclusive. As the spring advances the average southern limit extends southward, and reaches its lowest latitude, N. 40° 58′, in June. After June the southern limit contracts, and in August is north of the 45th parallel. The extreme southern position of ice was noted in May and June, when it was somewhat south of the 40th parallel, and in September, 1890, ice was reported south of the 45th parallel. The average eastern limit of ice extends eastward from February to W. 40° 41′ in April, and contracts during the summer and fall months to W. 48° 33′ in October. The extreme eastern limit varies from 35° to 45°, being farthest east in February and April, when it is east of W. 36°, from which latter month it contracts west of 45° by October. The most remarkable year was 1890, when large quantities of ice appeared in January, and the icefields extended unusually far to the eastward and southward.

The following table gives barometric data used in the preparation of the pressure charts of this Bulletin:

Barometric data—Foreign series.

Stations.	Latitude N.	Longitude.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Algerian.	° ′	° ′	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*
Algiers	36 47	E. 3 05	30.18	30.14	30.03	29.97	29.96	30.02	30.00	29.98	30.00	30.04	30.08	30.12
Biskra	34 51	5 41	30.22	30.20	30.07	29.98	29.95	30.03	30.03	30.02	30.02	30.09	30.15	30.18
Geriville	33 53	1 40	....	....	....	30.02	30.01	30.04	30.04	30.10	30.05	30.07	29.96	30.01
La Calle	36 54	8 26	30.16	30.13	30.02	29.91	29.97	30.04	30.01	29.99	29.98	30.04	30.08	30.09
Laghouat	33 48	2 53	30.25	30.23	30.11	30.00	30.00	30.04	30.02	30.03	30.05	30.12	30.18	30.18
Mogador	31 30	W. 9 48	30.21	30.19	30.12	30.10	30.05	....	30.02	30.02	30.09	30.08	30.10	30.23
Nemours	35 06	1 50	30.21	30.17	30.05	29.98	29.98	30.02	30.02	29.99	29.99	30.05	30.11	30.16
Saida	34 51	E. 0 10	30.19	30.18	30.09	30.01	30.00	30.06	30.03	30.02	30.03	30.07	30.13	30.13
Tebessa	35 24	8 06	30.19	30.19	30.10	29.99	30.00	30.04	30.05	30.02	30.01	30.09	....	30.14
Tunis	36 42	10 13	30.14	30.13	30.02	29.92	29.98	30.02	30.00	30.00	29.98	30.05	30.10	30.05
Austrian.														
Agram	45 48	15 53	30.17	30.17	30.02	29.86	29.94	29.94	29.96	29.95	30.01	30.01	30.07	30.08
Cracow	50 04	20 00	30.15	30.16	30.01	29.90	29.94	29.91	29.93	29.93	30.00	29.99	30.03	30.07
Eperies	48 58	21 15	30.15	30.14	29.98	29.86	29.91	29.88	29.89	29.90	29.99	30.00	30.06	30.01
Gratz	47 04	15 28	30.16	30.12	29.99	29.86	29.93	29.95	29.94	29.93	29.98	29.99	30.05	30.05
Hermannstadt	45 47	24 13	30.18	30.11	29.93	29.87	29.88	29.85	29.85	29.86	29.98	29.97	30.07	30.06
Kremsmunster	48 03	14 08	30.15	30.12	30.00	29.83	29.92	29.92	29.94	29.93	29.98	29.98	30.04	30.03
Lemberg	49 50	24 00	30.14	30.14	29.97	29.91	29.94	29.90	29.92	29.92	29.99	30.04	30.07	30.03
Pola	44 52	13 51	30.08	30.09	29.99	29.85	29.95	29.94	29.97	29.93	29.98	29.98	30.00	30.03
Szathmar	47 46	22 53	30.15	30.14	29.93	29.85	29.90	29.86	29.89	29.91	29.98	30.00	30.05	30.00
Szegedin	46 15	20 10	30.14	30.13	29.99	29.84	29.90	29.89	29.89	29.91	29.97	29.98	30.05	30.05
Trieste	45 39	13 46	30.13	30.10	29.98	29.87	29.96	29.94	29.96	29.94	29.98	29.97	30.01	30.03
Vienna	48 12	16 22	30.15	30.13	30.00	29.86	29.94	29.93	29.96	29.94	30.01	30.00	30.04	30.05

Barometric data—Foreign series—Continued.

Stations.	Latitude N.	Longitude.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
British.	° ′	° ′	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*
Aberdeen	57 10	W. 2 06	29.89	29.83	29.90	29.89	29.92	29.93	29.84	29.85	29.88	29.82	29.77	29.74
Armagh	54 21	6 39	30.03	29.84	29.96	29.84	29.98	29.87	29.86	29.86	29.89	29.91	29.83	29.91
Bidston	53 24	3 04	29.99	29.91	29.97	29.88	29.96	29.94	29.90	29.87	29.90	29.91	29.86	29.85
Bradford	53 48	1 47	29.96	29.91	29.96	29.85	29.92	29.94	29.89	29.88	29.90	29.89	29.85	29.89
Bridgetown	13 04	59 37	30.01	30.00	30.00	30.06	29.99	30.02	30.02	29.98	29.96	29.95	29.95	29.99
Chatham	51 25	E. 0 33	30.05	30.00	30.02	29.88	29.99	29.99	29.97	29.94	29.99	29.94	29.93	29.97
Falmouth	50 09	W. 5 04	30.04	29.98	30.03	29.87	30.01	30.00	30.01	29.98	29.98	29.91	29.92	29.98
Freetown	8 30	13 14	29.88	29.85	29.88	29.87	29.87	29.88	29.91	29.92	29.87	29.86	29.87	29.88
Galway	53 15	9 03	29.85	29.75	29.91	29.83	29.88	29.93	29.89	29.86	29.87	29.89	29.85	29.88
Gibraltar	36 09	5 21	30.15	30.17	30.05	29.99	30.01	30.05	30.00	30.00	30.00	30.04	30.09	30.12
Glasgow	55 53	4 17	29.99	29.79	29.80	29.82	29.87	29.82	29.82	29.87	29.88	29.83	29.83	29.80
Greenwich	51 29	00	30.04	29.98	30.02	29.87	29.98	29.99	29.95	29.93	29.95	29.92	29.91	29.94
Guernsey	49 27	2 41	30.06	30.01	30.03	29.87	30.00	30.00	30.00	29.97	29.98	29.97	29.94	29.98
Kew	51 28	0 19	30.04	29.99	30.02	29.87	29.97	29.97	29.94	29.93	29.96	29.92	29.91	29.94
Leicester	52 39	1 08	30.02	29.96	30.00	29.87	29.96	29.97	29.92	29.90	29.94	29.92	29.90	29.91
Malta	36 00	E. 14 30	30.02	30.06	29.95	29.87	29.97	29.97	29.97	29.94	29.96	30.01	30.02	30.01
Nassau	25 04	W. 77 22	30.15	30.14	30.11	30.06	30.04	30.06	30.08	30.02	30.00	29.99	30.08	30.13
Oxford	51 46	1 17	30.04	29.97	30.02	29.88	29.97	29.94	29.95	29.94	29.94	29.95	29.93	29.95
Plymouth	50 22	4 10	30.02	29.97	30.01	29.85	29.98	30.00	29.98	29.96	29.96	29.93	29.92	29.98
Scutari	41 00	E. 29 03	30.08	30.08	29.96	29.88	29.88	29.85	29.82	29.84	29.91	30.02	30.04	30.00
Swanbister	58 55	W. 3 05	29.81	29.75	29.82	29.84	29.90	29.91	29.80	29.82	29.81	29.82	29.72	29.68
Valentia	51 55	10 18	29.94	29.86	29.98	29.84	29.97	29.98	29.94	29.93	29.92	29.94	29.90	29.94
Canadian.														
Chatham	47 03	65 59	29.98	30.00	29.91	29.91	29.99	29.91	29.89	29.94	30.04	30.05	29.95	29.98
Father Point	48 34	68 28	29.99	30.02	29.90	29.90	29.97	29.86	29.85	29.91	30.00	30.00	29.94	29.98
Fort Garry	49 51	97 07	30.17	30.17	30.11	30.02	29.96	29.90	29.91	29.93	29.95	29.99	30.07	30.17
Halifax	44 39	63 30	30.00	30.01	29.90	29.90	30.01	29.96	29.95	29.98	30.05	30.07	30.01	30.03
Kingston	44 14	76 30	30.08	30.08	29.99	29.97	29.98	29.96	29.93	29.99	30.06	30.08	30.03	30.06
Montreal	45 31	73 33	30.06	30.04	29.97	29.94	29.96	29.92	29.91	29.96	30.05	30.05	30.02	30.04
Parry Sound	45 19	80 01	30.05	30.08	30.02	29.98	29.98	29.95	29.93	29.98	30.05	30.06	30.00	30.03
Port Dover	42 47	80 13	30.08	30.10	30.02	29.99	29.99	29.97	29.96	30.00	30.07	30.08	30.08	30.07
Port Stanley	42 40	81 13	30.09	30.08	30.02	29.99	29.98	29.96	29.96	30.00	30.06	30.07	30.07	30.07
Quebec	46 48	71 12	30.04	30.05	29.95	29.92	29.98	29.90	29.89	29.94	30.02	30.05	29.98	30.06
Rockliffe	46 10	77 48	30.07	30.08	30.03	29.99	29.98	29.94	29.92	29.97	30.06	30.06	30.00	30.02
Saint Andrews	45 04	67 06	29.99	30.00	29.88	29.89	29.97	29.94	29.91	29.94	30.07	30.06	29.95	29.98
Saint Pierre	46 30	72 10	29.89	29.91	29.77	29.93	29.97	29.91	29.92	29.93	29.96	29.97	29.85	29.86
Saugeen	44 30	81 21	30.05	30.06	30.02	29.99	29.97	29.95	29.95	29.98	30.00	30.05	30.00	30.01
Sydney	46 08	60 10	29.92	29.94	29.86	29.86	29.98	29.92	29.90	29.94	30.04	30.00	29.94	29.92
Toronto	43 39	79 23	30.09	30.10	30.02	30.00	30.00	29.98	29.96	30.01	30.08	30.12	30.06	30.06
Yarmouth	43 50	66 02	30.06	30.02	29.86	29.90	29.99	29.95	29.93	29.99	30.07	30.07	30.02	30.00
York Factory	57 00	93 00	30.03	30.11	30.18	30.09	30.04	29.97	29.85	29.89	29.97	29.96	30.02	30.03
Moose Factory	51 00	81 00	29.97	30.04	....	29.95	29.98	29.97	29.89	29.94	....	29.91	29.97	30.00
Fort Rae	62 39	115 44	30.47	30.42	30.47	30.20	30.25	29.99	29.99	30.01	30.04	30.00	30.19	30.31
Minnedosa	50 13	99 48	30.22	30.24	30.12	29.98	29.91	29.89	29.90	29.93	29.89	30.00	30.05	30.17
Qu'Appelle	50 44	103 42	30.24	30.23	30.10	30.01	29.88	29.89	29.91	29.95	29.96	30.03	30.04	30.19
Medicine Hat	50 01	110 37	30.18	30.18	30.04	29.95	29.87	29.81	29.86	29.88	29.90	29.95	30.00	30.17
Calgary	51 00	114 05	....	....	....	29.95	29.95	29.97	29.93	....	29.93	....	....	30.20
Edmonton	54 00	113 00	30.34	30.22	....	....	....	....	....	....	....	....	....	....
Saint Johns, N. F.	47 00	53 00	29.82	29.90	29.81	29.87	30.06	30.00	30.04	30.01	30.08	30.10	30.05	29.91
Chinese.														
Zi-Ka-Wei	31 12	E. 121 26	30.37	30.33	30.22	30.10	29.90	29.78	29.73	29.77	29.94	30.14	30.29	30.35
Danish.														
Copenhagen	55 41	12 36	29.99	30.00	29.93	29.92	29.93	29.90	29.86	29.85	29.92	29.92	29.86	29.79
Fanoe	55 27	8 24	29.99	29.98	29.94	29.90	29.94	29.91	29.88	29.87	29.90	29.85	29.84	29.80
Godthaab	64 11	W. 51 46	29.50	29.57	29.66	29.80	29.88	29.76	29.80	29.75	29.67	29.68	29.67	29.57
Stykkisholm	65 05	22 46	29.30	29.46	29.63	29.75	29.81	29.73	29.70	29.69	29.62	29.55	29.60	29.39
Thorshavn	62 02	6 44	29.67	29.63	29.78	29.87	29.87	29.88	29.82	29.79	29.74	29.81	29.65	29.61
Vestervig	56 47	E. 8 20	29.93	29.94	29.90	29.90	29.90	29.87	29.82	29.83	29.86	29.86	29.82	29.73
French.														
Agen	44 12	0 38	30.13	30.16	30.03	29.93	30.05	30.06	30.09	30.05	30.07	30.11	30.08	30.14
Alencon	48 26	0 05	30.10	30.07	30.03	29.88	29.99	30.01	30.02	29.98	30.01	29.99	29.98	30.05
Avignon	43 57	4 49	30.09	30.09	30.00	29.85	29.96	29.98	30.00	29.95	30.00	29.99	30.02	30.06
Bar-sur-Seine	48 07	4 22	30.13	30.09	30.03	29.85	29.99	30.00	30.02	29.98	30.04	29.98	30.00	30.06
Besançon	47 13	6 02	30.16	30.10	30.03	29.90	29.98	30.00	30.02	30.00	30.03	30.00	30.03	30.12
Bordeaux	44 50	0 32	30.11	30.09	30.02	29.87	30.00	30.00	30.04	30.03	30.03	30.00	30.03	30.10
Brest	48 24	W. 4 30	30.07	30.01	30.03	29.85	30.01	30.03	30.03	29.98	30.02	29.98	29.98	30.04
Caen	49 11	0 21	30.00	30.02	30.01	29.83	29.96	29.98	30.02	29.96	29.94	29.96	29.97	29.99
Chalons-sur-Marne	48 57	E. 4 21	30.12	30.09	30.02	29.86	29.96	29.98	30.01	29.96	29.99	29.98	29.99	30.03
Clermont	45 40	3 05	30.13	30.08	30.00	29.83	29.97	29.98	30.00	29.96	30.00	29.98	30.01	30.08
Greasque	43 25	5 37	30.08	30.10	30.00	29.86	29.96	29.97	20.96	29.96	30.04	29.98	30.01	30.04
Lorient	47 45	W. 3 21	30.10	30.04	30.05	29.88	30.04	30.05	30.05	30.01	30.00	29.99	29.98	30.05
Mans	48 00	E. 0 12	30.13	30.10	30.05	29.86	30.01	30.02	30.04	30.01	30.00	29.99	30.00	30.07
Marseille	43 18	5 23	30.06	30.06	29.97	29.83	29.96	30.00	30.00	29.96	29.99	29.97	29.99	30.04
Perpignan	42 42	2 53	30.10	30.10	30.02	29.87	29.99	30.01	30.02	29.99	30.01	30.00	30.04	30.09
Rochefort	45 56	W. 0 58	30.13	30.09	30.04	29.88	30.00	30.04	30.06	30.02	30.04	30.00	30.02	30.09
Roche-sur-Yon	46 40	1 26	30.12	30.08	30.04	29.87	30.01	30.01	30.04	30.01	30.06	29.99	30.02	30.08
Rouen	49 26	1 05	30.09	30.05	30.03	29.86	30.00	29.99	30.01	29.98	29.99	29.96	29.96	30.01
Saint Maur	48 48	2 21	30.11	30.08	30.04	29.86	30.01	30.03	30.04	30.02	30.01	30.00	29.99	30.05
Toulouse	43 37	1 27	30.13	30.10	30.03	29.88	30.00	30.04	30.05	30.01	30.04	30.02	30.03	30.11
Versailles	48 48	2 07	30.15	30.02	30.03	29.84	30.00	30.00	30.01	29.97	29.94	29.99	30.02	30.07
German.														
Bamberg	49 54	E. 10 54	30.13	30.07	30.02	29.88	29.95	29.90	29.98	29.96	29.99	29.97	30.02	30.00
Berlin	52 30	13 19	30.08	30.07	29.99	29.89	29.96	29.94	29.94	29.91	29.95	29.93	29.93	29.92
Breslau	51 07	17 02	30.12	30.12	30.01	29.92	29.97	29.93	29.94	29.94	30.00	29.98	29.99	29.97
Carlsruhe	49 01	8 25	30.16	30.11	30.03	29.87	29.98	29.97	29.99	29.96	30.00	30.00	30.01	30.04
Cassel	51 19	9 28	30.09	30.02	30.01	29.88	29.96	29.95	29.96	29.94	29.97	29.95	29.96	29.90
Frankfort	50 08	8 41	30.15	30.11	30.05	29.89	29.99	29.98	29.99	29.95	29.97	29.98	30.00	30.02
Friedrichshafen	47 39	9 29	30.17	30.13	30.03	29.85	29.97	29.97	29.99	29.96	30.01	30.00	30.03	30.06
Hamburg	53 33	9 58	30.04	30.04	29.98	29.90	29.90	29.93	29.92	29.91	29.95	29.90	29.90	29.90
Kiel	54 19	10 04	30.03	30.01	29.96	29.91	29.95	29.93	29.90	29.89	29.96	29.89	29.88	29.84
Leipsig	51 20	12 24	30.12	30.09	30.03	29.90	29.97	29.95	29.97	29.94	29.99	29.97	29.99	29.97
Memel	55 43	21 07	29.98	30.06	29.95	29.97	20.90	29.90	29.90	29.89	30.00	29.93	29.92	29.85
Neufahrwasser	54 24	18 40	30.06	30.08	29.97	29.95	29.98	29.94	29.92	29.91	29.99	29.94	29.93	29.88
Stuttgart	48 47	9 11	30.12	30.07	30.00	29.80	29.93	29.95	29.97	29.94	29.98	29.96	29.99	30.01
Wustrow	54 21	12 24	30.04	30.04	29.98	29.93	29.97	29.93	29.92	29.90	29.96	29.92	29.89	29.85
Greek.														
Athens	37 58	23 43	30.08	30.09	29.99	29.91	29.95	29.86	29.85	29.87	29.96	30.01	30.05	30.02
Indian.														
Agra	27 10	78 05	30.03	29.96	29.83	29.69	29.56	29.45	29.47	29.52	29.64	29.82	29.98	30.05
Allahabad	25 26	81 52	30.03	29.95	29.82	29.67	29.57	29.44	29.47	29.54	29.65	29.82	29.97	30.04
Belgaum	15 52	74 42	29.92	29.80	29.82	29.75	29.72	29.73	29.76	29.78	29.82	29.84	29.88	29.92
Bellary	15 09	70 57	29.88	29.83	29.74	29.68	29.63	29.64	29.66	29.68	29.72	29.81	29.85	29.87
Bombay	18 54	72 49	29.95	29.92	29.87	29.80	29.76	29.69	29.69	29.73	29.79	29.84	29.90	29.94
Calcutta	22 23	88 21	30.01	29.94	29.83	29.71	29.64	29.53	29.52	29.58	29.67	29.81	29.94	30.00
Chittagong	22 21	91 50	30.00	29.96	29.89	29.79	29.72	29.61	29.61	29.66	29.77	29.83	29.92	29.99
Cuttack	20 29	85 54	30.00	29.93	29.84	29.73	29.65	29.54	29.54	29.59	29.66	29.83	29.94	30.01
Deesa	24 10	72 14	29.99	29.94	29.84	29.73	29.61	29.52	29.50	29.60	29.69	29.83	29.96	30.01
Dhubri	26 07	89 50	30.00	29.92	29.80	29.70	29.66	29.55	29.53	29.59	29.68	29.81	29.94	30.02
Hazaribaugh	24 00	85 24	30.02	29.95	29.82	29.68	29.57	29.52	29.51	29.56	29.66	29.83	29.97	30.04
Jeypore	26 55	75 50	30.02	29.97	29.83	29.70	29.57	29.47	29.47	29.55	29.67	29.83	29.98	30.06
Jubbulpore	23 09	79 59	30.02	29.94	29.82	29.69	29.57	29.51	29.53	29.58	29.67	29.84	29.98	30.03
Kurrachee	24 47	67 04	30.03	29.99	29.90	29.79	29.68	29.54	29.51	29.59	29.71	29.78	29.98	30.04
Lahore	31 34	74 20	30.06	29.99	29.85	29.70	29.56	29.41	29.43	29.49	29.63	29.82	29.99	30.06
Lucknow	26 50	81 00	30.03	29.90	29.83	29.69	29.58	29.46	29.47	29.53	29.65	29.82	29.98	30.04
Nagpur	21 09	79 11	29.97	29.89	29.78	29.67	29.56	29.54	29.56	29.60	29.67	29.83	29.93	29.99
Patna	25 37	85 08	30.03	29.95	29.81	29.67	29.59	29.49	29.50	29.55	29.65	29.83	29.96	30.04
Poona	18 28	74 10	29.92	29.80	29.77	29.72	29.69	29.67	29.69	29.74	29.83	29.83	29.89	29.94
Roorkee	29 52	77 56	30.01	29.96	29.85	29.69	29.56	29.42	29.47	29.52	29.63	29.87	29.98	30.05
Sibsagar	26 59	94 40	30.05	29.98	29.89	29.80	29.72	29.59	29.56	29.61	29.71	29.80	29.93	30.04
Trichinopoly	10 50	78 44	29.99	29.98	29.94	29.85	29.80	29.78	29.80	29.81	29.83	29.87	29.93	29.98
Aden	12 45	45 03	30.00	30.00	29.90	29.88	29.82	29.72	29.67	29.69	29.77	29.92	30.00	30.05
Bushire	28 59	50 49	30.13	30.07	29.98	29.87	29.75	29.57	29.48	29.53	29.70	29.92	30.05	30.11
Amini Divi	11 06	72 48	?	?	?	?	29.85	29.83	29.86	29.87	29.92	29.90	29.91	29.95
Silchar	24 49	92 50	30.04	30.00	29.91	29.82	29.76	29.64	29.63	29.68	29.76	29.88	29.98	30.03
Sironcha	18 51	80 00	30.03	29.99	29.90	29.80	29.71	29.66	29.69	29.70	29.76	29.88	29.98	30.03
Mangalore	12 52	74 54	29.96	29.94	29.92	29.86	29.83	29.83	29.84	29.85	29.89	29.89	29.89	29.93
Madras	13 04	80 14	30.01	29.99	29.93	29.84	29.70	29.72	29.74	29.77	29.79	29.86	29.94	30.00
Cochin	9 58	76 17	29.94	29.93	29.91	29.87	29.85	29.87	29.88	29.89	29.91	29.90	29.91	29.93
Colombo	6 56	79 52	29.92	29.92	29.91	29.86	29.85	29.86	29.87	29.88	29.90	29.90	29.90	29.91
Jaffna	9 40	79 56	29.98	29.96	29.92	29.85	29.79	29.78	29.79	29.80	29.83	29.80	29.90	29.94
Batticaloa	7 43	81 44	29.98	29.97	29.94	29.87	29.82	29.81	29.83	29.83	29.80	29.88	29.91	29.94
Akyab	20 28	92 57	30.02	29.97	29.92	29.85	29.78	29.70	29.69	29.73	29.78	29.87	29.96	30.01
Thayetmyo	19 22	95 12	29.98	29.92	29.86	29.77	29.74	29.71	29.70	29.72	29.77	29.86	29.96	29.98
Diamond Island	15 52	94 19	30.01	29.98	29.94	29.87	29.82	29.77	29.77	29.79	29.83	29.89	29.93	29.98
Rangoon	16 46	96 12	29.99	29.95	29.91	29.84	29.79	29.77	29.77	29.79	29.83	29.88	29.93	29.98
Mergui	12 11	98 38	29.96	29.95	29.92	29.87	29.84	29.83	29.83	29.84	29.87	29.88	29.90	29.94
Port Blair	11 41	92 42	29.96	29.95	29.93	29.86	29.81	29.79	29.80	29.81	29.84	29.87	29.90	29.94
Nancowry	8 00	93 46	29.94	29.94	29.92	29.88	29.85	29.84	29.85	29.86	29.88	29.89	29.90	29.92
Penang	5 30	101 00	30.01	30.01	29.98	29.96	29.87	29.96	29.96	29.98	29.99	29.99	29.98	29.99
Malacca	2 10	102 14	29.89	29.89	29.87	29.88	29.80	29.86	29.87	29.87	29.88	29.87	29.87	29.89
Singapore	1 17	103 51	29.95	29.92	29.91	29.87	29.87	29.89	29.88	29.88	29.89	29.88	29.89	29.89
Italian.														
Cagliari	39 30	9 00	30.06	30.06	29.96	29.86	29.92	29.95	29.97	29.94	29.94	29.98	30.00	29.98
Cosenza	39 19	16 17	30.07	30.11	29.98	29.89	29.96	29.96	29.95	29.94	30.00	30.01	30.03	30.04
Florence	43 46	11 15	30.07	30.09	29.97	29.84	29.96	29.96	29.96	29.93	29.98	29.99	30.00	30.00
Genoa	44 24	8 55	30.05	30.08	29.97	29.84	29.96	29.95	29.97	29.93	29.97	29.95	29.98	29.98
Lecca	40 22	18 12	30.07	30.08	29.97	29.87	29.96	29.94	29.95	29.91	29.99	30.01	30.04	29.99
Leghorn	43 33	10 18	30.04	30.06	29.96	29.83	29.94	29.95	29.97	29.93	29.96	29.95	29.97	29.97
Milan	45 28	9 11	30.13	30.16	29.98	29.85	29.94	29.94	29.96	29.93	29.98	29.95	30.04	30.03
Moncalieri	45 00	7 41	?	30.16	29.99	29.85	29.94	29.93	29.95	29.92	29.98	29.98	29.99	30.06
Padua	45 24	11 53	30.10	30.11	29.98	29.86	29.94	29.94	29.95	29.93	29.98	29.97	30.02	30.01
Palermo	38 07	13 21	30.03	30.06	29.98	29.89	29.99	29.99	30.00	29.98	30.01	30.01	30.02	30.01
Pesaro	43 55	12 53	30.09	30.09	29.99	29.86	29.96	29.96	29.97	29.94	29.98	29.98	30.01	30.02
Rome	41 54	12 29	30.03	30.07	29.90	29.85	29.93	29.97	29.97	29.93	29.98	29.97	30.00	29.98
Syracuse	37 03	15 15	30.04	30.08	29.98	29.89	29.98	29.98	29.96	29.94	29.98	30.03	30.05	30.01
Udine	46 04	13 13	30.09	30.10	29.98	29.86	29.93	29.94	29.95	29.92	29.98	29.97	30.01	30.00
Naples	40 52	14 15	30.07	30.08	29.97	29.88	29.94	29.89	29.97	29.93	29.98	30.01	30.05	30.02
Japanese.														
Awomori	40 51	140 45	30.00	30.03	29.97	29.97	29.89	29.83	29.85	29.87	29.93	30.06	30.06	29.92
Hakodate	41 46	140 44	29.98	30.01	29.95	29.97	29.90	29.84	29.86	29.87	29.93	30.05	30.02	29.91
Hiroshima	34 23	132 27	30.19	30.18	30.12	30.05	29.92	29.81	29.84	29.83	29.93	30.10	30.15	30.17
Kioto	35 01	135 46	30.13	30.16	30.10	30.01	29.95	29.84	29.86	29.88	29.94	30.08	30.11	30.14
Nagasaki	32 44	129 52	30.23	30.21	30.14	30.04	29.94	29.84	29.85	29.83	29.91	30.05	30.18	30.22
Niigata	37 55	139 03	30.08	30.10	30.04	30.02	29.92	29.83	29.85	29.88	29.95	30.07	30.08	30.02
Nobiru	38 23	141 11	30.02	30.04	30.00	30.01	29.93	29.85	....	29.90	29.98	30.07	30.06	29.99
Tokyo	35 41	139 46	30.04	30.08	30.02	30.03	29.92	29.86	29.87	29.89	29.96	30.08	30.07	29.99
Wakayama	34 14	135 09	30.15	30.15	30.09	30.02	29.93	29.84	29.85	29.86	29.93	30.10	30.13	30.13
Mexican.														
Leon	21 07	W. 101 35	30.23	30.18	30.08	30.02	29.98	29.98	30.03	29.94	29.97	29.96	30.18	30.21
Mazatlan	23 12	106 17	30.03	30.02	29.99	29.97	29.94	29.87	29.95	29.91	29.85	29.83	29.94	30.02
Mexico	19 26	99 00	30.27	30.24	30.19	30.10	30.07	30.05	30.13	30.05	30.06	30.18	30.28	30.29
Puebla	19 03	98 03	30.27	30.28	30.18	30.15	30.11	30.07	30.16	30.08	30.07	30.15	30.26	30.28

Barometric data—Foreign series—Continued.

Stations.	Latitude N.	Longitude.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Netherlands.	° ′	° ′	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*
Flushing	51 24	E. 3 35	30.10	30.06	30.03	29.88	30.00	29.99	29.99	29.96	29.98	29.93	29.92	29.95
Groningen	53 12	6 34	30.09	30.05	29.99	29.89	29.97	29.97	29.95	29.93	29.93	29.90	29.90	29.89
Helder	52 58	4 45	30.07	30.01	29.99	29.88	29.97	29.97	29.94	29.92	29.93	29.89	29.85	29.88
Hellevœtluis	51 49	4 08	30.08	30.04	30.01	29.88	29.98	29.97	29.96	29.94	29.96	29.91	29.91	29.92
Utrecht	52 05	5 07	30.10	30.04	30.01	29.89	29.98	29.97	29.96	29.95	29.96	29.93	29.96	29.93
Norwegian.														
Bergen	60 24	5 20	29.90	29.86	29.86	29.90	29.88	29.87	29.80	29.80	29.82	29.81	29.74	29.70
Brono	65 28	12 14	29.81	29.71	29.75	29.88	29.82	29.85	29.82	29.80	29.75	29.76	29.65	29.56
Christiania	59 55	10 45	29.92	29.94	29.88	29.92	29.87	29.82	29.77	29.78	29.86	29.84	29.81	29.74
Gjaesvaer	71 07	25 22	29.61	29.61	29.56	29.83	29.86	29.85	29.80	29.80	29.79	29.70	29.57	29.51
Portuguese.														
Angra	38 39	W. 27 14	30.06	30.04	30.09	30.10	30.18	30.21	30.26	30.15	30.19	30.09	30.06	30.05
Campo Major	39 02	6 59	30.21	30.18	30.05	29.97	29.98	30.03	30.00	29.97	30.03	30.04	30.12	30.16
Funchal	32 38	16 55	30.18	30.19	30.10	30.10	30.11	30.18	30.13	30.10	30.14	30.10	30.08	30.13
Lisbon	38 42	9 08	30.18	30.16	30.04	29.98	30.04	30.09	30.08	30.04	30.08	30.07	30.10	30.17
Ponta Delgada	37 45	25 41	30.14	30.16	30.14	30.13	30.18	30.24	30.29	30.21	30.21	30.14	30.13	30.17
Russian (Asia).														
Akmolinski	51 12	E. 71 23	30.17	30.22	30.19	29.99	29.81	29.64	29.60	29.70	29.84	30.08	30.22	30.25
Barnaul	53 20	83 47	30.39	30.34	30.25	30.10	29.91	29.72	29.66	29.75	29.95	30.17	30.28	30.38
Ekaterinburg	56 49	60 38	30.10	30.09	29.98	30.00	29.87	29.76	29.70	29.74	29.92	30.03	30.06	30.08
Nertchinsk	51 19	119 37	30.67	30.50	30.30	30.04	29.87	29.77	29.77	29.82	30.03	30.26	30.44	30.51
Nikolaievsk	53 08	140 45	30.00	30.05	29.96	29.84	29.80	29.76	29.72	29.74	29.87	29.89	29.91	29.83
Pekin	39 57	116 28	30.40	30.37	30.20	29.99	29.78	29.68	29.66	29.76	29.98	30.14	30.30	30.40
Tashkend	41 20	69 18	30.34	30.32	30.09	29.95	29.87	29.74	29.63	29.66	29.98	30.16	30.29	30.30
Yeniseisk	58 27	92 06	30.40	30.35	30.25	30.10	29.96	29.78	29.76	29.83	30.02	30.14	30.35	30.42
Russian (Europe).														
Archangel	64 33	40 32	29.79	29.87	29.73	29.94	29.88	29.81	29.77	29.81	29.91	29.80	29.83	29.72
Astrakhan	46 21	48 02	30.21	30.24	30.06	29.99	29.93	29.85	29.80	29.85	30.04	30.16	30.23	30.18
Dorpat	58 23	26 43	29.97	30.03	29.90	29.98	29.93	29.85	29.81	29.84	29.97	29.92	29.90	29.81
Kasan	55 47	49 08	30.09	30.14	29.96	30.01	29.89	29.82	29.74	29.78	29.96	30.03	30.05	30.04
Kertch	45 21	36 29	30.12	30.14	29.97	29.94	29.93	29.87	29.84	29.87	29.99	30.08	30.11	30.06
Kieff	50 27	30 30	30.10	30.13	29.94	29.92	29.91	29.84	29.82	29.85	30.00	30.01	30.04	29.99
Lugan	48 35	39 20	30.13	30.17	29.96	29.95	29.89	29.79	29.76	29.83	30.00	30.08	30.12	30.06
Moscow	55 46	37 40	30.04	30.11	29.92	30.00	29.91	29.81	29.78	29.81	30.01	30.01	30.00	29.93
Nikolaiev	46 58	31 58	30.14	30.17	29.98	29.95	29.93	29.88	29.84	29.89	30.02	30.06	30.10	30.05
Saint Petersburg	59 56	30 16	29.92	29.99	29.86	29.97	29.90	29.83	29.78	29.81	29.94	29.91	29.86	29.78
Tiflis	41 43	44 47	30.20	30.18	30.01	29.95	29.91	29.82	29.77	29.79	29.96	30.10	30.19	30.18
Warsaw	52 13	21 02	30.09	30.11	29.97	29.91	29.94	29.89	29.89	29.89	29.98	30.00	29.98	29.94
Spanish.														
Barcelona	41 23	2 15	30.08	30.09	29.99	29.86	29.97	30.00	30.04	29.98	30.01	29.99	30.04	30.06
Bilbao	43 15	W. 2 59	30.14	30.11	30.04	29.91	30.04	30.07	30.08	30.03	30.05	30.02	30.05	30.12
Burgos	42 20	3 46	30.24	30.22	30.05	29.93	30.00	30.03	30.01	29.97	30.03	30.09	30.12	30.19
Madrid	40 25	3 42	30.19	30.18	30.02	29.90	29.96	29.96	29.94	29.91	29.97	30.10	30.11	30.18
Murcia	37 59	1 10	30.17	30.12	30.04	29.89	29.95	29.99	30.00	29.99	30.03	30.04	30.10	30.14
Santiago	42 53	8 28	30.11	30.06	29.99	29.89	29.99	30.04	30.05	30.00	30.03	30.01	30.03	30.12
Habana	23 08	82 23	30.11	30.08	30.08	30.03	30.00	30.01	30.04	30.00	29.98	29.97	30.06	30.10
Manila	14 35	E. 120 57	29.99	29.99	29.96	29.91	29.88	29.87	29.83	29.85	29.85	29.91	29.86	29.98
San Fernando	36 28	W. 6 13	30.19	30.19	30.06	30.01	30.04	30.06	30.06	30.02	30.08	30.10	30.10	30.18
San Juan, Puerto Rico	18 30	66 10	30.08	30.08	30.07	30.04	30.02	30.05	30.06	30.02	29.99	29.95	29.99	30.04
Swedish.														
Haparanda	65 47	E. 24 03	29.88	29.88	29.75	29.92	29.88	29.83	29.79	29.80	29.88	29.80	29.74	29.68
Hernosand	62 32	17 57	29.95	29.89	29.79	29.92	29.88	29.85	29.79	29.80	29.88	29.82	29.77	29.70
Stockholm	59 20	18 04	29.99	29.95	29.87	29.93	29.89	29.84	29.79	29.80	29.90	29.83	29.82	29.73
Umea	63 50	20 17	29.87	29.87	29.79	29.93	29.88	29.84	29.79	29.80	29.88	29.82	29.75	29.69
Wisby	57 39	18 19	29.97	29.94	29.87	29.91	29.89	29.84	29.81	29.80	29.90	29.85	29.82	29.73
Upsala	59 51	17 37	29.96	29.94	29.85	29.94	29.86	29.81	29.78	29.79	29.87	29.83	29.80	29.67
Swiss.														
Geneva	46 12	6 08	30.16	30.14	30.04	29.87	29.97	29.99	30.00	30.00	30.02	30.02	30.05	30.11
Turkish.														
Constantinople	41 02	28 59	30.12	30.14	30.01	29.93	29.83	29.89	29.89	29.91	29.99	30.05	30.07	30.06
Valona	40 27	19 27	30.05	30.09	30.02	29.93	29.96	29.97	29.97	29.98	30.11	30.07	30.09	30.03
Beirut	33 54	35 28	30.06	30.02	29.97	29.91	29.94	29.83	29.76	29.77	29.88	29.98	30.02	30.03

United States series.

Stations.	Latitude N.	Longitude.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Eastport	44 54	W. 66 59	30.01	30.01	29.90	29.91	29.97	29.95	29.93	29.99	30.05	30.04	29.98	29.99
Portland	43 39	70 15	30.04	30.05	29.94	29.94	29.98	29.95	29.93	29.99	30.06	30.05	30.03	30.03
Boston	42 21	71 04	30.08	30.08	29.97	29.96	30.01	29.99	29.97	30.02	30.10	30.09	30.06	30.06
Block Island	41 10	71 36	30.10	30.12	29.98	29.97	30.01	30.00	29.99	30.03	30.10	30.14	30.08	30.08
New Haven	41 18	72 56	30.11	30.11	30.01	29.99	30.02	30.00	29.98	30.03	30.10	30.11	30.09	30.10
New London	41 21	73 05	30.10	30.11	30.00	29.98	30.03	30.01	29.99	30.03	30.10	30.10	30.08	30.09
Albany	42 39	73 45	30.12	30.12	30.02	30.00	30.01	29.99	29.97	30.03	30.10	30.12	30.11	30.11
New York	40 43	74 00	30.11	30.13	30.03	30.00	30.03	30.01	30.00	30.04	30.11	30.12	30.10	30.13
Philadelphia	39 57	75 09	30.15	30.14	30.04	30.01	30.03	30.02	30.00	30.04	30.12	30.13	30.13	30.14
Atlantic City	39 22	74 25	30.12	30.10	30.03	30.00	30.03	30.01	30.00	30.03	30.11	30.11	30.11	30.13
Baltimore	39 18	76 37	30.17	30.15	30.05	30.02	30.04	30.01	30.01	30.04	30.12	30.13	30.13	30.15
Washington	38 54	77 02	30.17	30.16	30.07	30.04	30.06	30.04	30.03	30.06	30.14	30.15	30.15	30.17
Lynchburg	37 25	79 09	30.16	30.15	30.06	30.04	30.06	30.05	30.04	30.06	30.13	30.15	30.15	30.16
Norfolk	36 51	76 17	30.16	30.16	30.07	30.03	30.05	30.04	30.03	30.04	30.11	30.13	30.15	30.16
Hatteras	35 15	75 40	30.15	30.14	30.06	30.03	30.04	30.04	30.04	30.03	30.08	30.11	30.13	30.16
Wilmington	34 14	77 57	30.18	30.17	30.09	30.05	30.06	30.06	30.06	30.05	30.10	30.14	30.17	30.19
Charlotte	35 13	80 51	30.16	30.17	30.07	30.04	30.05	30.06	30.05	30.05	30.11	30.14	30.15	30.17
Charleston	32 47	79 58	30.18	30.17	30.10	30.05	30.05	30.06	30.06	30.04	30.08	30.12	30.15	30.18
Augusta	33 28	81 54	30.22	30.21	30.12	30.07	30.07	30.07	30.08	30.06	30.11	30.15	30.19	30.21
Savannah	32 05	81 05	30.19	30.18	30.11	30.07	30.06	30.06	30.07	30.05	30.08	30.12	30.16	30.20
Jacksonville	30 20	81 39	30.19	30.18	30.13	30.07	30.05	30.07	30.08	30.05	30.06	30.09	30.15	30.19
Cedar Keys	29 08	83 02	30.16	30.18	30.16	30.06	30.03	30.06	30.07	30.02	30.04	30.06	30.13	30.17
Key West	24 34	81 49	30.14	30.13	30.10	30.05	30.02	30.05	30.07	30.02	29.99	30.00	30.07	30.13
Atlanta	33 45	84 23	30.19	30.18	30.11	30.06	30.08	30.08	30.08	30.07	30.12	30.16	30.17	30.20
Pensacola	30 25	87 13	30.18	30.17	30.12	30.06	30.03	30.04	30.06	30.02	30.05	30.10	30.15	30.18
Mobile	30 41	88 02	30.19	30.16	30.12	30.06	30.04	30.05	30.07	30.04	30.06	30.11	30.17	30.19
Montgomery	32 23	86 18	30.20	30.18	30.11	30.06	30.05	30.06	30.07	30.05	30.08	30.13	30.18	30.20
Vicksburg	32 22	90 53	30.19	30.16	30.11	30.04	30.03	30.04	30.07	30.04	30.07	30.13	30.18	30.20
New Orleans	29 58	90 04	30.17	30.13	30.09	30.03	30.02	30.03	30.06	30.02	30.03	30.09	30.15	30.17
Shreveport	32 30	93 40	30.18	30.12	30.08	30.00	30.00	30.01	30.04	30.02	30.06	30.10	30.15	30.17
Fort Smith	35 22	94 24	30.18	30.13	30.06	29.98	29.97	29.98	30.01	30.01	30.06	30.11	30.14	30.17
Little Rock	34 45	92 06	30.19	30.14	30.09	30.01	29.99	30.00	30.03	30.02	30.07	30.12	30.15	30.19
Galveston	29 18	94 47	30.15	30.11	30.06	30.00	29.98	30.00	30.04	30.01	30.01	30.08	30.13	30.14
Brownsville	25 53	97 26	30.14	30.08	30.03	29.95	29.94	29.96	30.00	29.97	29.98	30.05	30.10	30.13
Rio Grande City	26 22	98 45	30.20	30.13	30.08	30.00	29.99	30.00	30.03	30.01	30.04	30.12	30.18	30.20
Palestine	31 45	95 40	30.18	30.13	30.08	30.01	30.00	30.02	30.06	30.04	30.06	30.11	30.16	30.19
San Antonio	29 27	98 28	30.16	30.14	30.05	29.97	29.95	29.96	30.01	29.99	30.02	30.08	30.13	30.15
Chattanooga	35 04	85 15	30.20	30.19	30.14	30.06	30.07	30.07	30.07	30.06	30.13	30.17	30.19	30.21
Knoxville	35 56	83 58	30.21	30.18	30.11	30.06	30.08	30.08	30.09	30.09	30.15	30.18	30.19	30.21
Memphis	35 09	90 03	30.18	30.15	30.09	30.02	30.02	30.02	30.05	30.04	30.09	30.13	30.17	30.19
Nashville	36 10	86 47	30.17	30.14	30.09	30.02	30.03	30.03	30.04	30.03	30.10	30.13	30.15	30.17
Louisville	38 15	85 45	30.17	30.14	30.08	30.02	30.02	30.02	30.04	30.04	30.10	30.14	30.15	30.16
Indianapolis	39 46	86 10	30.13	30.11	30.05	30.00	30.01	30.00	30.03	30.04	30.09	30.11	30.11	30.14
Cincinnati	39 06	84 30	30.17	30.14	30.07	30.02	30.03	30.02	30.03	30.05	30.11	30.13	30.14	30.16
Columbus	39 58	83 00	30.15	30.13	30.06	30.01	30.02	30.01	30.03	30.04	30.10	30.12	30.12	30.14
Pittsburg	40 32	80 02	30.12	30.11	30.04	30.00	30.01	30.00	30.01	30.03	30.10	30.10	30.10	30.12
Rochester	43 08	77 42	30.08	30.09	30.01	29.99	30.00	29.98	29.97	30.02	30.08	30.07	30.05	30.06
Buffalo	42 53	78 53	30.07	30.08	30.00	29.99	30.00	29.99	29.98	30.02	30.08	30.07	30.04	30.06
Oswego	43 29	76 35	30.08	30.09	30.02	30.00	30.01	29.98	29.97	30.02	30.08	30.08	30.05	30.07
Erie	42 07	80 05	30.10	30.10	30.03	30.00	30.01	29.99	29.99	30.02	30.09	30.08	30.07	30.08
Cleveland	41 30	81 42	30.12	30.10	30.04	30.01	30.02	30.00	30.01	30.03	30.09	30.09	30.09	30.11
Sandusky	41 25	82 40	30.12	30.11	30.04	30.01	30.02	30.00	30.02	30.04	30.09	30.09	30.09	30.11
Toledo	41 40	83 34	30.10	30.09	30.04	30.01	30.01	30.00	30.02	30.04	30.09	30.09	30.07	30.10
Detroit	42 20	83 03	30.10	30.09	30.04	30.01	30.01	29.99	30.00	30.03	30.08	30.08	30.07	30.09
Alpena	45 05	83 30	30.04	30.06	30.02	30.00	29.99	29.95	29.96	30.00	30.03	30.03	30.01	30.03
Escanaba	44 48	87 05	30.06	30.07	30.04	30.00	29.99	29.95	29.96	30.00	30.02	30.02	30.02	30.03
Grand Haven	43 05	86 18	30.06	30.05	30.02	29.99	29.99	29.97	29.98	30.01	30.05	30.05	30.04	30.05
Mackinaw City	45 47	84 39	30.05	30.07	30.03	30.01	29.99	29.96	29.97	30.02	30.04	30.02	30.01	30.01
Marquette	46 34	87 24	30.06	30.08	30.05	30.02	30.00	29.96	29.97	30.01	30.01	30.02	30.02	30.04
Port Huron	43 00	82 26	30.07	30.08	30.02	29.99	30.00	29.99	29.99	30.02	30.07	30.07	30.05	30.06
Chicago	41 52	87 38	30.09	30.07	30.04	29.99	29.99	29.97	29.99	30.01	30.06	30.07	30.07	30.08
Milwaukee	43 02	87 54	30.08	30.07	30.03	29.99	29.99	29.97	30.00	30.02	30.05	30.05	30.05	30.07
Duluth	46 48	92 06	30.10	30.11	30.08	30.03	30.00	29.95	29.94	29.99	30.01	30.02	30.04	30.08
Saint Paul	44 58	93 03	30.10	30.08	30.04	29.97	29.95	29.91	29.96	29.98	30.00	30.01	30.04	30.08
La Crosse	43 49	91 15	30.11	30.09	30.05	29.98	29.97	29.94	29.97	30.00	30.03	30.04	30.07	30.10
Davenport	41 30	90 38	30.13	30.10	30.00	29.99	29.99	29.97	30.01	30.02	30.07	30.09	30.10	30.13
Des Moines	41 35	93 37	30.15	30.14	30.07	29.99	29.98	29.96	30.01	30.02	30.05	30.09	30.10	30.15
Dubuque	42 30	90 44	30.13	30.11	30.06	29.98	30.00	29.96	30.01	30.03	30.06	30.07	30.09	30.13
Keokuk	40 22	91 20	30.14	30.10	30.05	29.98	29.97	29.96	30.00	30.01	30.05	30.09	30.10	30.13
Cairo	37 00	89 10	30.19	30.15	30.08	30.01	30.01	30.01	30.04	30.04	30.09	30.13	30.15	30.18
Springfield	39 48	89 39	30.16	30.13	30.07	30.01	30.01	30.00	30.03	30.05	30.09	30.12	30.13	30.17
Saint Louis	38 38	90 12	30.17	30.13	30.08	30.00	30.00	30.00	30.03	30.04	30.09	30.12	30.15	30.17
Leavenworth	39 19	94 57	30.19	30.14	30.08	29.99	29.98	29.97	30.01	30.03	30.07	30.10	30.14	30.18
Omaha	41 16	95 56	30.19	30.16	30.09	30.00	29.97	29.96	30.01	30.03	30.06	30.10	30.14	30.17
Fort Sully	44 39	100 39	30.09	30.07	30.08	30.01	29.94	29.92	29.96	29.99	30.03	30.05	30.10	30.15
Huron, S. Dak	44 21	98 09	30.17	30.14	30.10	29.98	29.95	29.93	29.96	29.97	30.01	30.04	30.10	30.15
Yankton	42 54	97 28	30.16	30.14	30.08	29.98	29.95	29.94	29.97	29.99	30.02	30.05	30.10	30.15
Moorhead	46 52	99 44	30.15	30.14	30.09	30.01	29.96	29.91	29.95	29.98	30.00	30.03	30.08	30.13
Saint Vincent	48 56	97 14	30.16	30.15	30.12	30.04	29.98	29.93	29.95	29.97	29.99	30.03	30.09	30.14
Bismarck	46 47	100 38	30.11	30.09	30.08	30.00	29.94	29.91	29.95	29.98	30.00	30.02	30.07	30.11
Fort Buford	48 00	103 56	30.07	30.07	30.01	29.94	29.87	29.83	29.87	29.89	29.94	29.97	30.01	30.08
Fort Assinaboine	48 32	109 42	30.13	30.10	30.04	29.99	29.96	29.91	29.93	29.96	29.99	30.04	30.08	30.11
Fort Custer	45 42	107 34	30.11	30.07	30.05	30.00	29.96	29.91	29.94	29.93	30.01	30.05	30.11	30.13
Fort Maginnis	47 12	109 10	30.05	30.06	30.01	29.98	29.96	29.92	29.95	29.96	29.99	30.02	30.03	30.05
Helena	46 34	112 04	30.12	30.08	30.03	30.00	29.96	29.93	29.96	29.95	29.99	30.04	30.10	30.13
Deadwood	44 23	103 43	30.09	30.09	30.06	30.01	29.96	29.94	29.97	29.96	30.04	30.05	30.11	30.11
Cheyenne	41 08	104 48	30.09	30.08	30.05	29.99	29.94	29.92	29.93	29.95	29.99	30.05	30.09	30.08
North Platte	41 08	100 45	30.17	30.14	30.08	29.99	29.94	29.94	29.98	29.99	30.03	30.07	30.13	30.16
Denver	39 45	105 00	30.10	30.06	30.01	29.94	29.91	29.89	29.90	29.91	29.94	30.02	30.09	30.07
Las Animas	38 04	103 07	30.15	30.09	30.02	29.93	29.92	29.88	29.90	29.94	29.97	30.03	30.11	30.11
Dodge City	37 45	100 00	30.16	30.13	30.06	29.96	29.95	29.93	29.99	30.01	30.06	30.08	30.13	30.16
Fort Elliott	35 30	100 21	30.08	30.05	29.99	29.91	29.89	29.88	29.93	29.95	29.99	30.03	30.06	30.07
Fort Sill	34 40	98 23	30.16	30.15	30.07	29.97	29.96	29.96	30.01	30.01	30.05	30.10	30.15	30.17
Fort Davis	30 38	103 56	30.13	30.09	30.04	29.98	29.96	29.96	29.99	30.00	30.02	30.08	30.12	30.13
Santa Fe	35 41	105 57	30.14	30.10	30.03	29.97	29.93	29.91	29.95	29.98	30.00	30.03	30.10	30.11
Fort Apache	33 48	109 57	30.17	30.12	30.09	30.00	29.97	29.95	29.96	29.97	30.00	30.03	30.13	30.15
Fort Grant	32 39	109 57	30.14	30.12	30.06	30.00	29.90	29.93	29.97	29.96	29.98	30.02	30.11	30.14
Prescott	34 33	112 28	30.14	30.10	30.06	29.96	29.94	29.92	29.94	29.95	29.98	30.04	30.09	30.11
Yuma	32 45	114 36	30.08	30.05	29.99	29.91	29.84	29.79	29.81	29.79	29.81	29.92	30.03	30.07
El Paso	31 47	106 30	30.14	30.09	30.03	29.96	29.92	29.90	29.94	29.95	29.97	30.04	30.12	30.15
Salt Lake City	40 46	111 54	30.14	30.08	30.06	29.96	29.93	29.89	29.89	29.90	29.96	30.07	30.19	30.18
Winnemucca	40 58	117 43	30.15	30.09	30.06	29.98	29.95	29.92	29.90	29.89	29.97	30.07	30.16	30.16
Boise City	43 37	116 08	30.22	30.13	30.08	30.02	29.98	29.95	29.94	29.94	30.02	30.11	30.20	30.20

Barometric data—United States series—Continued.

Stations.	Latitude N.	Longitude.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
	° ′	° ′	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.
Spokane Falls	47 40	117 25	30.11	30.08	30.03	30.00	30.00	29.96	29.96	29.96	30.00	30.06	30.13	30.11
Olympia	47 03	122 53	30.04	30.02	30.01	30.03	30.06	30.06	30.06	30.03	30.04	30.06	30.07	30.04
Portland	45 32	122 43	30.10	30.07	30.04	30.06	30.07	30.07	30.07	30.03	30.04	30.08	30.11	30.08
Roseburg	43 13	123 20	30.13	30.10	30.07	30.09	30.08	30.09	30.07	30.05	30.06	30.11	30.15	30.12
Red Bluff	40 10	122 15	30.14	30.09	30.04	30.01	29.96	29.91	29.89	29.87	29.93	30.02	30.11	30.12
Sacramento	38 35	121 30	30.15	30.10	30.06	30.02	29.97	29.91	29.89	29.87	30.01	30.01	30.10	30.13
San Francisco	37 48	122 26	30.15	30.11	30.08	30.04	30.00	29.96	29.95	29.93	29.94	30.02	30.11	30.12
Los Angeles	34 03	118 15	30.08	30.06	30.05	30.01	29.96	29.93	29.94	29.91	29.91	29.98	30.04	30.07
San Diego	32 43	117 10	30.10	30.08	30.06	30.02	29.96	29.94	29.95	29.92	29.92	29.99	30.05	30.08
United States sub-series.														
Kingston	18 01	76 48	30.10	30.07	30.10	30.05	30.02	30.05	30.06	30.03	30.01	30.00	30.03	30.06
Paramaribo	5 50	55 13	30.06	30.03	30.03	30.02	30.04	30.05	30.04	30.03	30.02	30.01	30.00	30.03
Puerto Berrio	6 22	74 28	29.95	29.97	29.98	30.00	30.01	29.93	29.92	30.01	29.99	29.98	30.02	29.95
Rivas	11 26	85 47	....	30.08	30.15	30.06	30.08	30.05	30.06	....	30.01	29.98	30.15	30.02

Ocean square series.

Ocean squares.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
° ′ ° ′	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.
N. 12 30, W. 22 30	30.00	29.97	30.01	30.01	30.00	30.03	30.01	29.98	29.98	29.98	29.99	29.99
27 30	30.03	30.00	30.03	30.03	30.01	30.05	30.01	30.00	30.00	30.00	30.00	30.00
32 30	30.04	30.02	30.04	30.04	30.06	30.06	30.06	30.01	30.00	30.01	29.99	30.01
37 30	30.05	30.03	30.06	30.07	30.07	30.07	30.08	30.03	30.01	30.02	30.00	30.03
42 30	30.06	30.03	30.05	30.07	30.08	30.08	30.09	30.03	30.02	30.02	30.00	30.03
47 30	30.05	30.04	30.06	30.06	30.07	30.08	30.10	30.03	30.01	30.02	30.00	30.03
52 30	30.03	30.04	30.04	30.04	30.06	30.06	30.08	30.03	30.00	30.00	30.01	30.02
57 30	....	29.98	29.99	30.00	30.02	30.07	30.05	30.01	29.98	29.99	30.00	30.01
N. 17 30, W. 22 30	30.07	30.03	30.06	30.06	30.04	30.06	30.04	30.01	30.01	30.02	30.02	30.04
27 30	30.08	30.06	30.08	30.07	30.07	30.09	30.06	30.02	30.03	30.03	30.04	30.04
32 30	30.10	30.07	30.08	30.10	30.10	30.12	30.11	30.06	30.04	30.04	30.04	30.05
37 30	30.12	30.10	30.10	30.10	30.12	30.13	30.13	30.08	30.06	30.05	30.06	30.07
42 30	30.12	30.11	30.10	30.11	30.12	30.13	30.13	30.08	30.06	30.05	30.05	30.07
47 30	30.11	30.11	30.10	30.10	30.11	30.13	30.14	30.08	30.05	30.03	30.05	30.07
52 30	30.10	30.08	30.08	30.08	30.09	30.11	30.11	30.06	30.03	30.01	30.03	30.06
57 30	30.08	30.08	30.07	30.05	30.06	30.08	30.08	30.03	30.01	30.00	30.00	30.06
N. 22 30, W. 22 30	30.11	30.10	30.10	30.11	30.10	30.13	30.10	30.06	30.07	30.06	30.06	30.08
27 30	30.11	30.13	30.13	30.11	30.13	30.15	30.13	30.09	30.09	30.09	30.09	30.10
32 30	30.14	30.15	30.12	30.12	30.16	30.17	30.16	30.10	30.09	30.10	30.09	30.10
37 30	30.15	30.17	30.15	30.11	30.17	30.19	30.18	30.13	30.10	30.09	30.09	30.11
42 30	30.18	30.16	30.14	30.10	30.17	30.19	30.19	30.14	30.10	30.07	30.10	30.12
47 30	30.18	30.15	30.12	30.11	30.16	30.19	30.20	30.13	30.09	30.07	30.10	30.12
52 30	30.16	30.14	30.12	30.08	30.13	30.17	30.16	30.12	30.08	30.04	30.07	30.12
57 30	30.15	30.13	30.11	30.08	30.11	30.14	30.14	30.10	30.05	30.04	30.06	30.11
62 30	30.14	30.13	30.12	30.07	30.09	30.12	30.12	30.08	30.03	30.00	30.04	30.10
67 30	30.15	30.12	30.11	30.07	30.07	30.10	30.11	30.07	30.02	29.99	30.04	30.10
72 30	30.13	30.11	30.11	30.05	30.05	30.08	30.08	30.04	30.02	29.99	30.03	30.10
N. 27 30, W. 22 30	30.15	30.16	30.14	30.12	30.14	30.18	30.17	30.12	30.13	30.11	30.10	30.13
27 30	30.15	30.18	30.16	30.12	30.18	30.20	30.20	30.15	30.14	30.11	30.11	30.12
32 30	30.15	30.16	30.16	30.13	30.20	30.21	30.24	30.17	30.16	30.12	30.13	30.12
37 30	30.17	30.21	30.16	30.12	30.21	30.21	30.25	30.19	30.18	30.12	30.11	30.12
42 30	30.22	30.19	30.16	30.11	30.21	30.23	30.25	30.18	30.15	30.10	30.12	30.12
47 30	30.21	30.18	30.13	30.08	30.19	30.20	30.23	30.18	30.14	30.10	30.11	30.13
52 30	30.19	30.19	30.11	30.07	30.16	30.20	30.20	30.16	30.12	30.09	30.11	30.14
57 30	30.20	30.16	30.09	30.06	30.13	30.18	30.18	30.14	30.09	30.05	30.11	30.14
62 30	30.18	30.16	30.10	30.07	30.10	30.14	30.16	30.11	30.07	30.03	30.09	30.14
67 30	30.18	30.14	30.11	30.08	30.09	30.12	30.12	30.09	30.05	30.02	30.08	30.14
72 30	30.17	30.14	30.11	30.08	30.07	30.10	30.11	30.08	30.04	30.03	30.09	30.14
77 30	30.16	30.15	30.11	30.07	30.05	30.08	30.08	30.03	30.03	30.04	30.09	30.15
N. 32 30, W. 12 30	30.18	30.17	30.10	30.08	30.09	30.14	30.11	30.05	30.11	30.12	30.11	30.10
17 30	30.17	30.19	30.13	30.11	30.13	30.19	30.17	30.12	30.15	30.14	30.10	30.15
22 30	30.14	30.17	30.16	30.13	30.16	30.23	30.22	30.17	30.17	30.16	30.09	30.15
27 30	30.14	30.18	30.15	30.14	30.20	30.24	30.27	30.20	30.18	30.16	30.13	30.13
32 30	30.15	30.19	30.15	30.12	30.21	30.24	30.28	30.22	30.20	30.16	30.12	30.14
37 30	30.14	30.19	30.12	30.08	30.22	30.23	30.28	30.22	30.19	30.15	30.12	30.12
42 30	30.14	30.17	30.10	30.08	30.20	30.23	30.26	30.22	30.18	30.13	30.14	30.12
47 30	30.15	30.15	30.06	30.05	30.18	30.19	30.23	30.20	30.14	30.11	30.13	30.11
52 30	30.16	30.14	30.04	30.03	30.14	30.17	30.20	30.18	30.12	30.08	30.13	30.11
57 30	30.16	30.14	30.03	30.02	30.10	30.15	30.17	30.14	30.10	30.07	30.11	30.11
62 30	30.15	30.10	30.03	30.03	30.07	30.12	30.13	30.10	30.09	30.06	30.11	30.11
67 30	30.16	30.14	30.04	30.03	30.06	30.10	30.09	30.07	30.08	30.07	30.10	30.13
72 30	30.16	30.14	30.06	30.05	30.06	30.06	30.07	30.06	30.08	30.09	30.13	30.15
77 30	30.17	30.16	30.08	30.05	30.05	30.05	30.04	30.04	30.08	30.10	30.17	30.18
N. 37 30, W. 12 30	30.17	30.15	30.06	30.01	30.07	30.13	30.11	30.07	30.11	30.08	30.10	30.17
17 30	30.15	30.14	30.10	30.06	30.11	30.20	30.18	30.13	30.15	30.11	30.11	30.16
22 30	30.13	30.14	30.14	30.10	30.16	30.24	30.26	30.19	30.19	30.18	30.11	30.16

Barometric data—Ocean square series—Continued.

Ocean squares.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
° ′ ° ′	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.
N. 27 30, W. 27 30	30.12	30.13	30.15	30.12	30.18	30.24	30.29	30.23	30.18	30.19	30.13	30.14
32 30	30.10	30.10	30.11	30.06	30.18	30.22	30.27	30.22	30.19	30.14	30.12	30.09
37 30	30.08	30.07	30.06	30.04	30.18	30.19	30.24	30.21	30.17	30.11	30.11	30.08
42 30	30.06	30.04	30.01	30.00	30.16	30.16	30.21	30.18	30.16	30.09	30.10	30.06
47 30	30.06	30.02	29.98	29.99	30.14	30.13	30.17	30.16	30.13	30.08	30.10	30.07
52 30	30.06	30.01	29.96	29.95	30.11	30.10	30.14	30.13	30.13	30.06	30.08	30.00
57 30	30.07	30.01	29.93	29.95	30.07	30.08	30.10	30.09	30.12	30.06	30.06	30.05
62 30	30.07	30.02	29.94	29.95	30.05	30.04	30.04	30.06	30.10	30.06	30.07	30.05
67 30	30.10	30.07	29.98	29.96	30.04	30.03	30.03	30.05	30.10	30.08	30.08	30.07
72 30	30.12	30.10	30.01	30.00	30.03	30.01	30.01	30.03	30.09	30.11	30.12	30.11
N. 42 30, W. 12 30	30.09	30.04	30.01	29.91	30.02	30.10	30.10	30.05	30.08	30.05	30.06	30.12
17 30	30.05	30.02	30.02	29.95	30.07	30.15	30.16	30.10	30.10	30.08	30.05	30.12
22 30	30.04	30.00	30.04	29.99	30.10	30.18	30.21	30.12	30.13	30.10	30.06	30.09
27 30	29.99	29.98	30.02	29.99	30.12	30.16	30.22	30.14	30.13	30.10	30.07	30.00
32 30	29.99	29.92	30.00	29.99	30.13	30.15	30.20	30.12	30.14	30.04	30.06	30.02
37 30	29.95	29.89	29.96	29.94	30.12	30.11	30.14	30.11	30.11	30.02	30.04	30.00
42 30	29.94	29.90	29.92	29.90	30.10	30.09	30.12	30.09	30.10	30.02	30.03	29.99
47 30	29.95	29.90	29.89	29.89	30.09	30.05	30.08	30.07	30.10	30.02	30.02	29.97
52 30	29.97	29.90	29.80	29.86	30.06	30.03	30.04	30.05	30.10	30.02	30.02	29.97
57 30	29.96	29.92	20.86	29.87	30.04	30.00	30.01	30.02	30.10	30.03	30.01	29.97
62 30	30.00	29.99	29.89	29.89	30.01	29.98	29.98	30.01	30.10	30.05	30.02	29.99
67 30	30.03	30.01	29.94	29.92	30.00	29.97	29.96	29.99	30.11	30.10	30.05	30.03
N. 47 30, W. 12 30	30.01	29.91	29.99	29.84	30.00	30.05	30.05	29.98	29.99	29.96	29.98	30.03
17 30	29.96	29.88	29.97	29.88	30.00	30.08	30.07	30.00	30.00	29.99	29.96	30.02
22 30	29.90	29.85	29.96	29.88	30.02	30.08	30.07	29.99	30.00	29.99	29.97	30.00
27 30	29.87	29.80	29.92	29.88	30.03	30.06	30.08	29.98	30.00	29.97	29.95	29.96
32 30	29.83	29.75	29.88	29.87	30.04	30.04	30.06	29.97	30.01	29.93	29.94	29.91
37 30	29.80	29.77	29.84	29.84	30.04	30.01	30.03	29.98	30.01	29.90	29.92	29.89
42 30	29.81	29.79	29.81	29.83	30.03	29.97	30.01	29.98	30.01	29.91	29.22	29.88
47 30	29.82	29.83	29.79	29.81	30.02	29.95	29.97	29.96	30.04	29.94	29.92	29.88
N. 52 30, W. 12 30	29.92	29.75	29.94	29.81	29.94	29.98	29.92	29.90	29.90	29.90	29.90	29.92
17 30	29.85	29.76	29.92	29.83	29.96	29.99	29.92	29.89	29.89	29.92	29.86	29.89
22 30	29.79	29.71	29.89	29.82	29.96	29.98	29.94	29.88	29.88	29.89	29.86	29.87
27 30	29.74	29.67	29.86	29.82	29.95	29.96	29.95	29.86	29.88	29.85	29.80	29.82
32 30	29.72	29.67	29.81	29.79	29.90	29.93	29.94	29.87	29.88	29.83	29.82	29.80
37 30	29.70	29.68	29.78	29.79	29.96	29.91	29.92	29.88	29.88	29.82	29.81	29.77
42 30	29.72	29.70	29.76	29.78	29.96	29.89	29.92	29.88	29.90	29.84	29.81	29.70
47 30	29.75	29.73	29.76	29.78	29.96	29.87	29.87	29.87	29.89	29.84	29.83	29.79
N. 57 30, W. 12 30	29.74	29.67	29.83	29.83	29.90	29.92	29.82	29.80	29.78	29.79	29.74	29.73
17 30	29.70	29.61	29.82	29.81	29.90	29.90	29.81	29.80	29.75	29.74	29.73	29.71
22 30	29.65	29.57	29.75	29.79	29.91	29.89	29.82	29.78	29.73	29.74	29.72	29.71
27 30	29.61	29.53	29.75	29.78	29.90	29.86	29.83	29.78	29.73	29.72	29.72	29.70
32 30	29.64	29.53	29.71	29.79	29.90	29.85	29.83	29.79	29.73	29.71	29.72	29.69
37 30	29.63	29.50	29.70	29.77	29.90	29.83	29.83	29.80	29.73	29.71	29.72	29.69
42 30	29.64	29.51	29.69	29.75	29.90	29.82	29.81	29.81	29.73	29.72	29.72	29.69
47 30	29.60	29.57	29.69	29.75	29.89	29.82	29.81	29.81	29.74	29.71	29.72	29.69

Arctic series.

Stations.	Latitude N.	Longitude.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
	° ′	° ′	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.
North Star Bay	76 34	W. 68 45	29.84	....	30.00	29.72	29.83	29.63	29.60	29.78	29.77	29.60	29.83	29.67
Rensselær Harbor	78 37	70 40	29.77	29.84	29.74	29.90	29.94	29.71	29.74	29.71	29.65	29.75	29.75	29.75
Foulke Fiord	70 19	66 00	29.83	29.75	29.82	30.06	29.98	29.68	29.69	....	29.68	29.62	30.09	30.03
Polaris House	78 18	70 21	29.68	29.90	29.80	30.22	30.05	29.71	....	....	....	....	29.93	29.86
Camp Clay	78 54	74 30	29.83	29.71	29.82	30.14	30.12	....	....	29.81	29.75	30.04	29.80	29.90
Polaris Bay	81 38	61 44	29.77	29.89	30.19	30.20	30.03	29.86	29.79	29.99	29.98	29.97	30.23	29.75
Discovery Harbor	81 44	64 45	29.68	29.99	30.10	30.33	29.93	29.80	29.60	29.75	29.70	29.98	30.19	29.65
Fort Conger			29.80	29.67	29.89	30.10	30.07	29.88	29.79	29.83	29.77	29.90	29.86	29.92
Floeberg Beach	82 27	61 18	29.61	29.98	30.10	30.30	29.92	29.80	29.60	29.72	29.68	29.95	30.15	29.61
Winter Harbor	74 47	110 48	30.08	29.77	29.80	29.98	30.11	29.82	29.67	29.73	29.90	29.81	29.94	29.86
Princess Royal Island	72 47	117 35	29.94	30.01	30.04	30.10	30.08	29.88	29.80	29.91	29.94	29.92	29.81	30.04
Walker Bay	71 35	117 39	29.90	29.85	30.16	30.03	30.00	29.82	29.76	29.85	29.93	29.86	30.09	30.11
Mercy Bay	74 06	117 55	29.85	30.00	30.14	30.12	30.08	29.82	29.77	29.88	29.86	29.99	30.10	30.04
Dealy Island	74 56	108 49	29.75	30.12	30.10	30.11	30.06	29.82	29.63	29.70	29.84	29.97	30.08	29.94
Melville Sound	74 42	101 22	29.68	29.76	29.88	30.01	....	....	....	....	29.82	29.81	29.82	29.84
Igloolik	69 21	81 53	29.75	29.84	30.03	29.97	29.91	29.93	29.53	29.50	29.73	29.83	29.71	29.59
Boothia Gulf	70 00	92 00	29.82	29.98	29.97	29.99	30.14	30.02	29.89	29.86	29.82	29.96	29.94	29.92
Cambridge Bay	69 03	105 12	29.80	29.95	30.06	30.02	30.03	29.81	29.68	....	....	29.95	30.01	29.93
Port Kennedy	72 01	94 14	29.97	29.92	30.16	30.17	30.00	29.90	29.70	....	30.00	29.79	30.04	29.86
Ivigtut	61 12	48 10	29.40	29.48	29.68	29.76	29.83	29.77	29.77	29.78	29.73	29.65	29.67	29.48
Jacobshavn	69 13	51 02	29.57	29.66	29.82	29.89	29.90	29.79	29.76	29.79	29.74	29.72	29.75	29.60
Upernavik	72 47	55 53	29.60	29.69	29.87	29.98	29.92	29.84	29.78	29.81	29.74	29.75	29.75	29.69
Port Bowen	73 13	88 55	29.76	29.89	30.11	30.07	30.05	29.89	29.82	29.68	29.69	29.96	29.80	29.87
Port Leopold	73 50	90 12	29.82	29.82	29.91	29.96	29.99	29.84	29.67	29.68	29.74	29.84	29.84	29.69

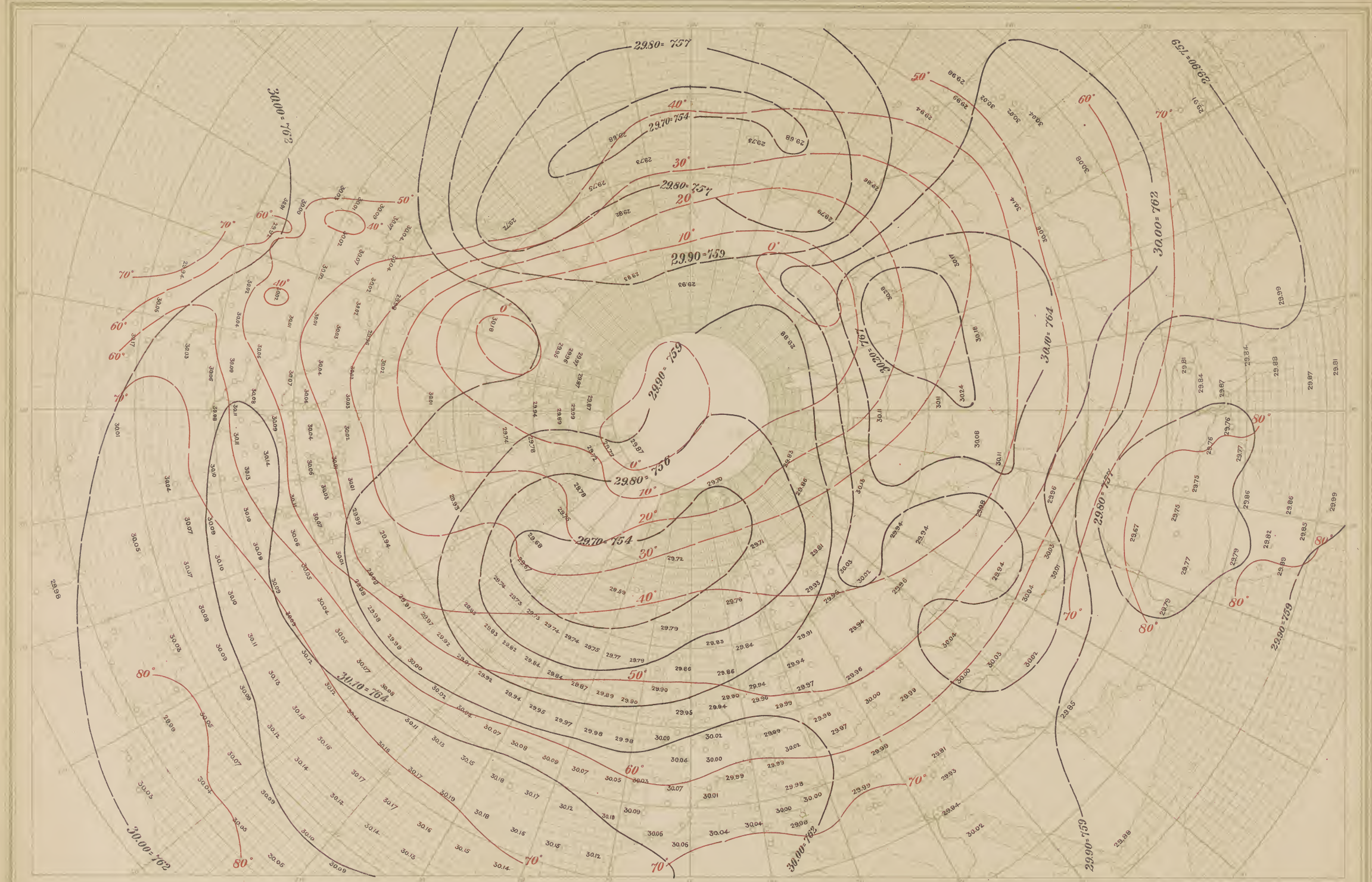
Barometric data—Arctic series—Continued.

Stations.	Latitude N.	Longitude.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
	° ′	° ′	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.
Griffith Island	74 34	W. 95 20	29.73	29.83	29.85	30.08	29.99	29.98	29.80	....	29.68	29.95	29.91	29.84
Northumberland Sound	76 52	97 00	29.70	30.05	30.08	30.02	29.91	29.72	29.61	29.66	29.78	29.94	30.05	29.89
Wellington Channel	75 31	92 22	29.61	29.72	29.84	30.00	29.98	29.76	29.64	29.73	29.74	29.79	29.72	29.81
Beechy Island	74 43	91 54	29.83	30.02	30.18	30.21	30.20	30.01	29.87	29.81	29.86	29.94	29.96	29.91
Winter Island	66 11	83 10	29.79	29.59	29.69	29.74	29.83	29.72	29.53	29.70	29.88	29.72	29.98	29.76
Repulse Bay	66 32	86 56	29.79	30.15	30.17	....	....	....	29.92	....	....	29.86	29.93	30.06
Marble Island	62 33	91 06	29.76	30.12	30.07	30.13	30.09	29.92	29.69	....	29.90	29.86	29.85	29.89
Sabine Island	74 32	18 49	29.78	29.98	30.17	29.86	29.87	29.92	29.71	29.95	29.86	29.87	29.76	29.80
Jan Mayen	70 58	8 35	29.41	29.29	29.98	29.76	29.78	29.94	29.82	29.69	29.64	29.78	29.61	29.89
Camden Bay	70 08	145 29	30.12	29.99	29.98	29.87	29.83	29.85	29.84	....	29.89	29.88	30.30	29.80
Point Barrow	71 16	156 40	29.90	29.97	30.05	30.00	29.98	29.91	29.84	29.79	29.81	29.90	29.86	29.99
Saint Michaels	63 28	161 48	29.78	30.00	29.89	29.86	29.81	29.84	29.86	29.80	29.70	29.72	29.75	29.81
Fort Alexander	58 57	158 18	29.62	29.92	29.86	29.80	29.78	29.88	29.59	29.87	29.76	29.69	29.57	29.68
Saint Pauls Island	57 09	170 18	29.61	29.76	29.88	29.85	29.78	29.78	29.86	29.88	29.69	29.57	29.57	29.57
Sitka	57 03	135 19	29.55	29.64	29.65	29.71	29.84	29.89	29.88	29.85	29.76	29.62	29.61	29.63
Unalaska	53 52	166 31	29.56	29.65	29.66	29.70	29.70	29.76	29.83	29.84	29.66	29.58	29.57	29.64
Nova Zembla	76 00	E. 59 00	29.58	29.72	29.69	30.04	30.01	29.80	29.82	29.81	29.76	29.86	29.97	29.83
Vardo	70 22	31 07	29.48	29.60	29.53	29.76	29.83	29.77	29.76	29.72	29.72	29.65	29.61	29.59
Spitzbergen	79 53	16 04	29.44	29.45	29.70	29.85	29.93	29.72	29.64	29.78	29.67	29.71	29.69	29.78
Petropaulovsk	53 00	158 39	29.52	29.63	29.77	29.77	29.70	29.65	29.69	29.81	29.80	29.72	29.62	29.54
Okhotsk	59 20	142 40	29.63	29.92	29.90	29.85	29.80	29.77	29.72	29.80	29.85	29.82	29.76	29.71
Bering Island	55 12	165 55	29.47	29.83	29.78	29.79	29.79	29.80	29.80	29.82	29.88	29.69	29.55	29.55
Gydaviken	72 20	77 00	29.91	30.10	29.69	29.84	20.74	29.89	29.89	....	....	29.84	29.39	29.92
Anadyr	64 55	177 19	30.12	30.07	29.86	29.95	29.90	29.91	....	....	....	29.79	29.86	29.91
Pitlekai	67 05	W. 173 23	29.64	30.24	29.89	29.79	29.91	29.78	29.73	....	....	29.84	29.68	29.96
Lena Delta	73 23	E. 124 50	29.95	30.10	30.12	30.05	29.79	29.67	29.84	29.78	29.69	29.76	29.87	29.94
Nova Zembla	72 23	52 42	29.64	29.71	29.58	30.15	29.96	29.88	29.72	29.87	29.88	30.02	29.91	29.97
Jeannette	73 28	179 47	30.20	30.12	30.07	30.00	29.94	29.68	29.60	29.83	29.85	29.99	29.86	29.98

Miscellaneous series.

Stations.	Latitude N.	Longitude.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Bangkok	13 38	E. 100 27	29.98	29.94	29.91	29.85	29.81	29.79	29.80	29.80	29.81	29.88	29.98	30.00
Prai a Santiago	14 54	W. 23 31	29.88	29.88	29.87	29.87	29.88	29.91	29.87	29.85	29.84	29.85	29.85	29.87
Krasnojarsk	56 01	E. 92 53	30.08	30.04	29.95	29.82	29.66	29.55	29.53	29.67	29.82	29.91	30.04	30.11
Irkutsk	52 16	104 05	28.78	28.72	28.62	28.59	28.35	28.26	28.19	28.26	28.45	28.59	28.66	28.68
Port Said	29 58	32 34	30.08	30.10	29.93	29.94	29.90	29.85	29.76	29.79	29.88	29.98	30.06	30.05
Cairo	29 59	31 18	29.85	29.85	29.96	29.99	30.02	30.06	30.13	30.12	30.01	29.93	29.88	29.84
Red Sea	26 05	34 16	30.21	30.18	30.06	30.03	30.01	29.90	29.86	29.84	29.89	30.04	30.09	30.15
Yarkand	38 25	77 16	26.20	25.97	25.87	25.89	25.84	25.74	25.65	25.76	25.97	26.14	26.18	26.09
Leh	34 10	77 36	19.53	19.48	19.42	19.63	19.61	19.56	19.56	19.57	19.61	19.66	19.70	19.67
Smyrna	38 26	27 10	30.03	29.97	29.85	29.92	29.89	29.84	29.77	29.77	29.91	29.98	29.99	30.00
New Chwang	40 57	121 27	30.46	30.35	30.27	30.01	30.00	29.83	29.83	29.93	30.13	30.27	30.25	30.35
Beresow	63 56	65 04	29.89	29.95	29.68	29.95	29.87	29.80	29.66	29.70	29.84	29.76	29.78	29.94
Due	50 50	142 26	29.53	29.48	29.44	29.36	29.37	29.38	29.37	29.38	29.46	29.50	29.41	29.48
Bermuda	32 23	W. 64 40	30.11	30.12	30.04	30.02	30.03	30.13	30.14	30.10	30.07	30.02	30.03	30.10
Vera Cruz	19 12	96 09	30.10	30.04	29.97	29.96	29.89	29.89	29.97	29.99	29.97	29.98	30.07	30.08
Cordoba	18 51	96 54	27.18	27.13	27.10	27.08	27.06	27.09	27.13	27.13	27.12	27.13	27.18	27.20
Belize	17 30	88 18	30.05	30.05	30.00	29.99	29.92	29.95	29.99	29.98	29.94	29.93	30.03	30.05
Guatemala	14 38	90 31	25.27	25.26	25.25	25.23	25.22	25.22	25.25	25.24	25.21	25.21	25.26	29.28
San Jose	9 56	84 00	26.31	26.32	26.32	26.32	26.31	26.31	26.31	26.31	26.30	26.29	26.29	26.30
Medellin	6 02	75 49	25.20	25.20	25.20	25.20	25.20	25.20	25.21	25.21	25.22	25.22	25.18	25.20
Harbor Grace	47 22	55 25	29.88	29.80	29.84	29.82	29.94	30.01	30.02	30.07	30.01	29.90	29.83	29.76
Vernoe	43 06	E. 77 47	30.23	30.28	30.07	29.88	29.70	29.64	29.53	29.60	29.84	30.12	30.32	30.28
Nikolsk	59 17	45 33	30.11	30.33	30.00	30.07	30.07	29.93	29.96	29.91	29.96	29.99	30.06	29.87
Semipalatinsk	50 33	80 06	30.41	30.43	30.32	30.13	29.95	29.72	29.70	29.78	29.94	30.21	30.48	30.50
Tomsk	55 00	85 00	30.24	....	....	....	....	....	....	....	....	....	....	29.58
Bielosersk	60 01	36 59	29.85	30.12	30.03	30.17	29.83	29.90	29.82	29.86	30.01	29.87	30.16	29.77
Sung-chu-chwang	37 59	102 48	24.65	24.58	24.54	25.10	25.17	25.04	....	....	....	25.36	....	25.06
Nemuro	43 20	145 35	29.89	29.86	29.87	29.96	29.91	29.87	29.88	29.91	29.96	30.04	29.94	29.81
Swift Current	50 21	W. 107 33	30.15	30.22	30.02	29.93	29.90	29.87	....	29.90	29.93	30.03	30.07	30.11
Province Wellesley	5 22	E. 100 30	29.90	29.88	29.86	29.84	29.85	29.85	29.83	29.86	29.88	29.87	29.86	29.88
Honolulu	21 18	W. 157 55	30.02	30.04	30.08	30.08	30.12	30.14	30.12	30.07	30.06	30.05	30.05	30.05
Saint Thomas	0 20	E. 6 43	29.88	29.85	29.86	29.89	29.89	29.96	29.98	29.98	29.95	29.92	29.90	29.90
Fort Chimo	58 00	W. 68 00	29.86	29.93	29.88	30.06	30.00	29.88	29.95	29.93	29.77	29.93	29.96	29.97
Tatoosh	48 16	124 45	29.94	29.96	29.96	30.00	30.02	30.03	30.05	30.02	29.99	30.03	30.00	29.95
Chabarowka	48 28	E. 135 07	30.10	30.13	30.02	29.91	29.74	29.78	29.73	29.78	29.81	30.00	30.12	30.13
Vladivostok	43 09	132 00	30.17	30.19	29.97	29.94	29.80	29.86	29.75	29.83	29.98	30.08	30.14	30.17
Olekminsk	60 22	120 26	30.77	30.73	30.49	30.25	30.13	30.00	30.02	30.08	30.26	30.38	30.56	30.64
Mesen	65 50	14 16	29.62	30.02	29.88	29.91	29.83	29.84	29.77	29.81	29.70	29.74	29.80	29.65
Turukhansk	65 55	87 38	30.30	30.18	30.14	30.05	30.05	29.94	29.92	29.97	30.02	30.07	30.22	30.44
Simjaja	65 41	40 14	29.61	29.85	29.70	29.89	29.90	29.86	29.80	29.83	29.91	29.87	29.70	29.80
Powenz	62 51	34 49	30.08	30.00	29.86	29.99	29.96	28.87	29.84	29.86	30.00	29.97	29.83	29.88
Bogoslovsk	59 45	60 01	29.94	29.95	29.90	29.93	30.01	29.88	29.78	29.85	29.95	30.04	30.07	30.06
Obdorsk	66 31	66 35	30.32	30.27	30.15	30.16	30.09	30.17	30.09	30.04	29.97	30.05	30.20	30.07
Schenkursk	62 06	42 54	30.03	30.67	30.10	30.13	30.00	29.92	29.81	29.78	29.78	30.19	30.07	29.86
Werchojansk	67 34	133 51	29.93	29.85	29.79	29.62	29.47	29.31	....	....	....	29.59	29.79	29.77
Krassnovodsk	56 01	92 49	30.34	30.37	30.24	30.15	30.11	29.95	30.01	30.07	30.26	30.42	30.48	30.46
Kasalinsk	45 46	62 07	30.12	30.40	29.99	29.88	29.83	29.68	29.59	29.65	29.85	30.10	30.18	30.22
Samarkand	39 49	67 18	30.28	30.29	30.11	29.96	29.90	29.71	29.64	29.67	29.93	30.15	30.24	30.28
Petro Alexandrovsk	41 30	61 00	30.28	30.36	30.08	29.94	29.90	29.75	29.71	29.74	29.96	30.19	30.26	30.26
Baku	40 21	49 51	30.20	30.29	29.99	29.98	29.95	29.83	29.83	29.84	29.98	30.13	30.18	30.13
Ashuruda	36 54	53 55	30.15	30.20	30.03	30.00	29.94	29.80	29.80	29.82	30.00	30.16	30.22	30.11

CHART 1.—UNITED STATES DEPARTMENT OF AGRICULTURE, WEATHER BUREAU, WASHINGTON, D.C.

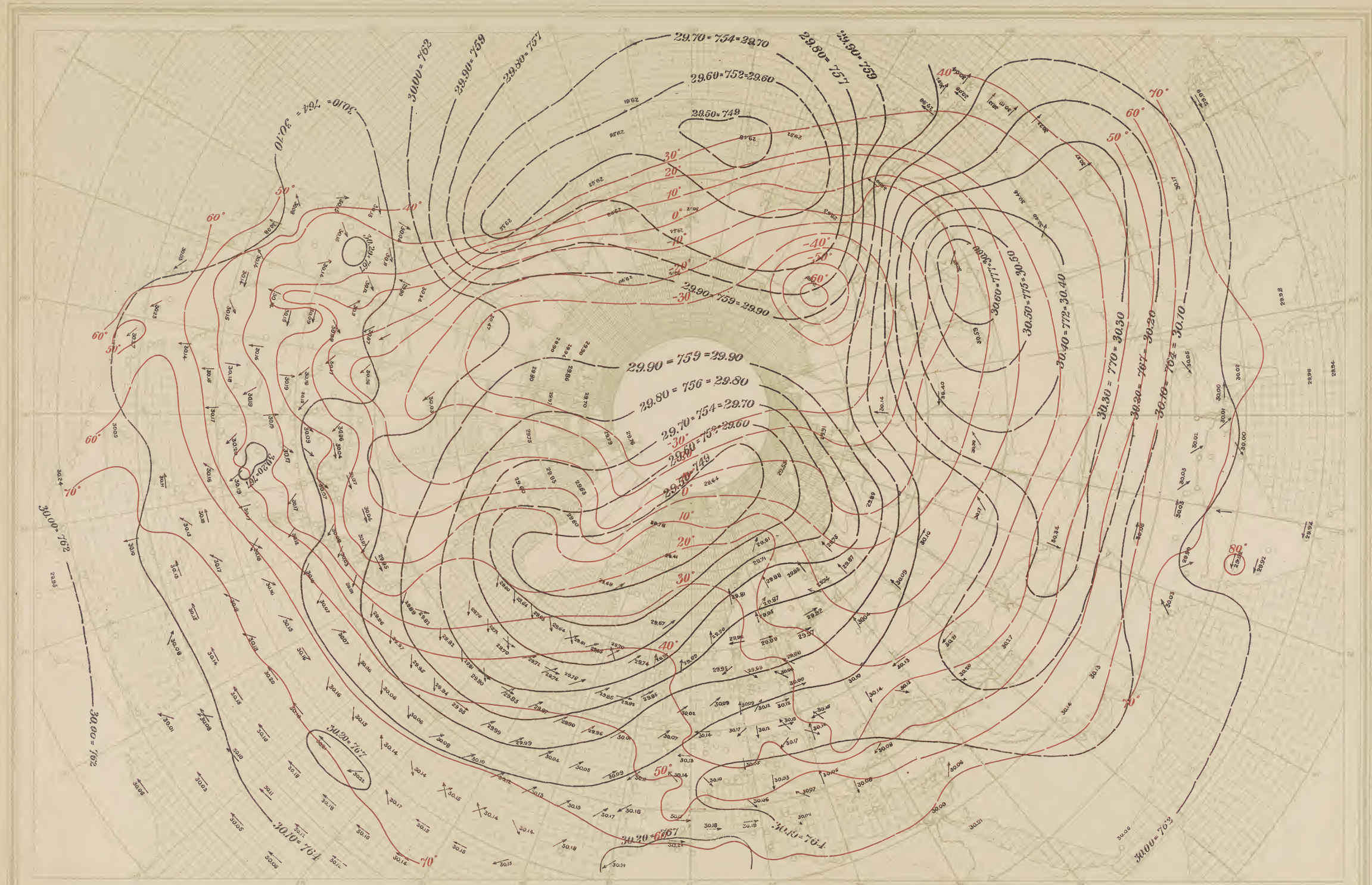


ANNUAL.

Normal Barometric Pressure for the Northern Hemisphere, determined from International Simultaneous Meteorological Observations taken at noon (Greenwich time), from 1878 to 1887.

Normal Temperature for the Northern Hemisphere, determined from International Simultaneous Observations taken at noon (Greenwich time), from 1878 to 1887, inclusive.

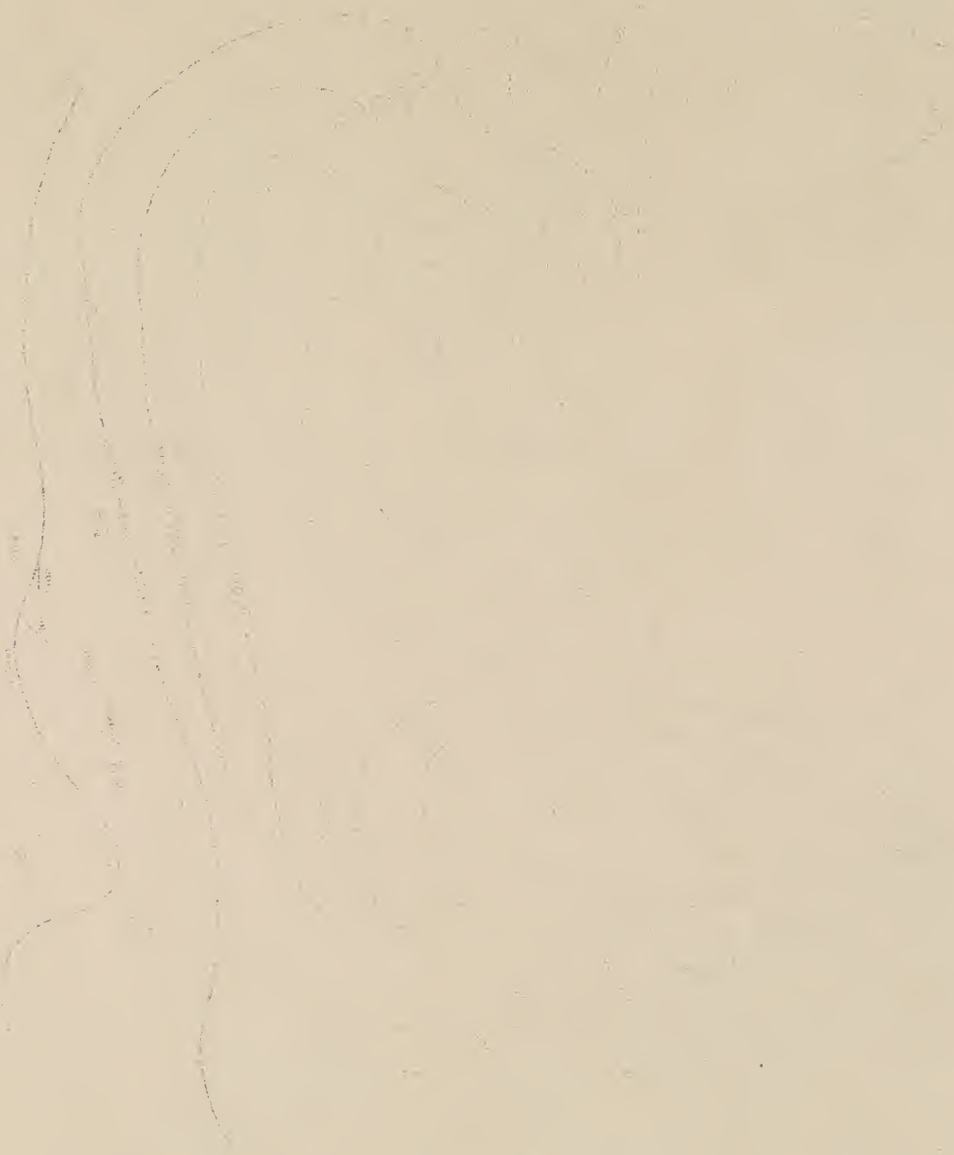
CHART 2.—UNITED STATES DEPARTMENT OF AGRICULTURE, WEATHER BUREAU, WASHINGTON, D.C.

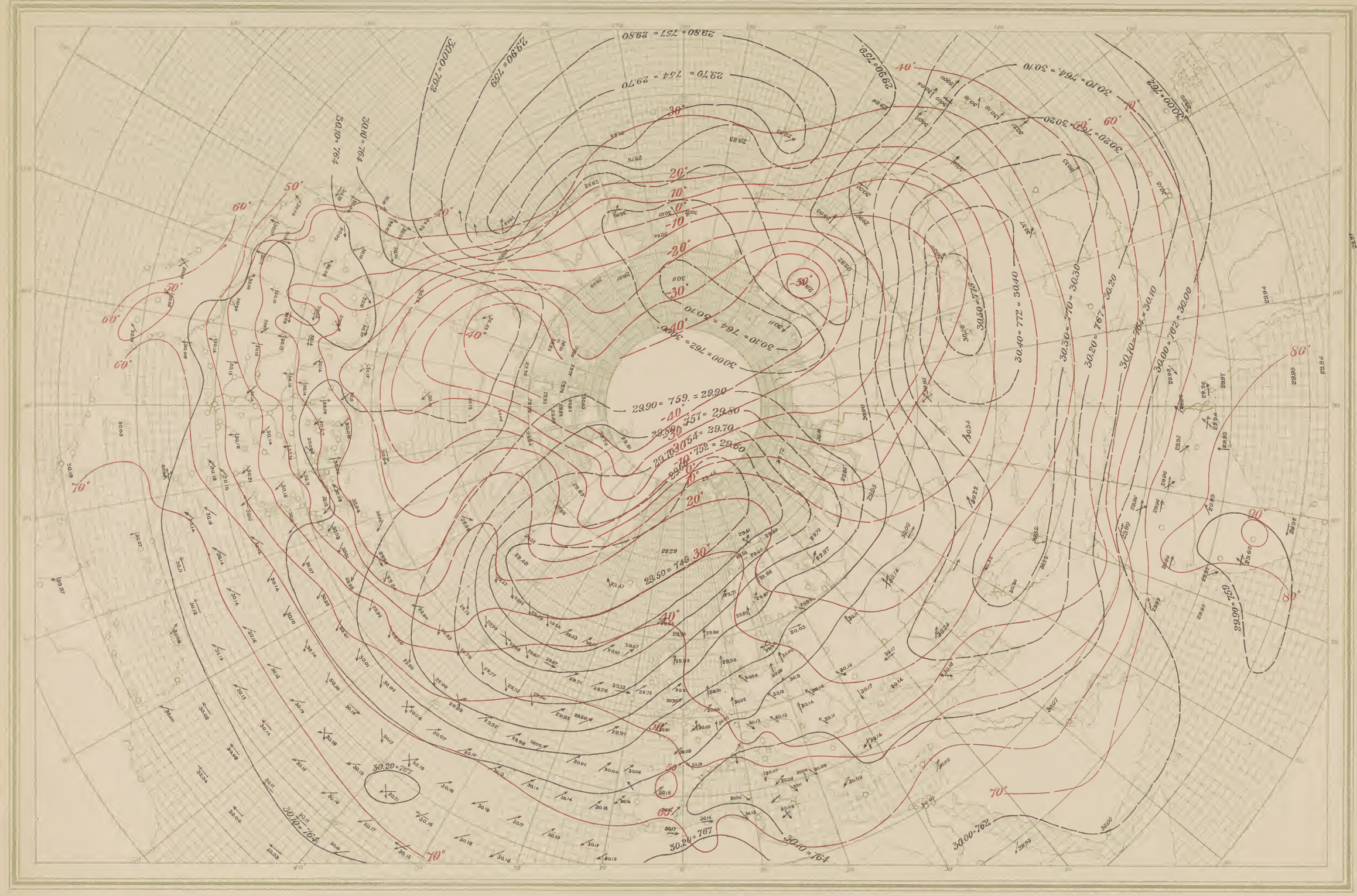


JANUARY.

Normal Barometric Pressure and Prevailing Winds for the Northern Hemisphere, determined from International Simultaneous Meteorological Observations taken at noon (Greenwich time), from 1878 to 1887.

Normal Temperature for the Northern Hemisphere, determined from International Simultaneous Observations taken at noon (Greenwich time), from 1878 to 1887, inclusive.



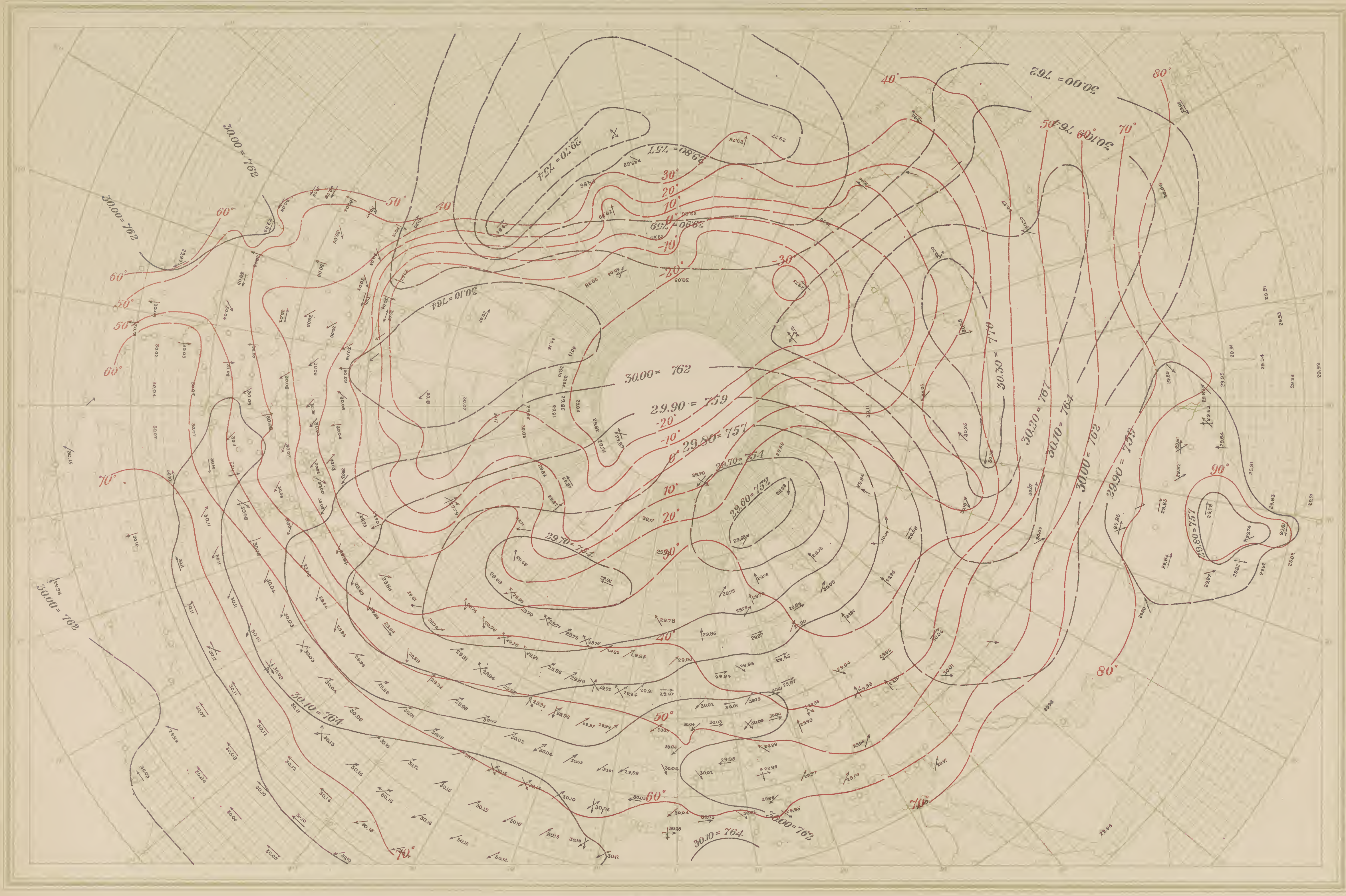


FEBRUARY.

Normal Barometric Pressure and Prevailing Winds for the Northern Hemisphere, determined from International Simultaneous Meteorological Observations taken at noon (Greenwich time), from 1878 to 1887.

Normal Temperature for the Northern Hemisphere, determined from International Simultaneous Observations taken at noon (Greenwich time), from 1878 to 1887, inclusive.

CHART 4.—UNITED STATES DEPARTMENT OF AGRICULTURE, WEATHER BUREAU, WASHINGTON, D. C.

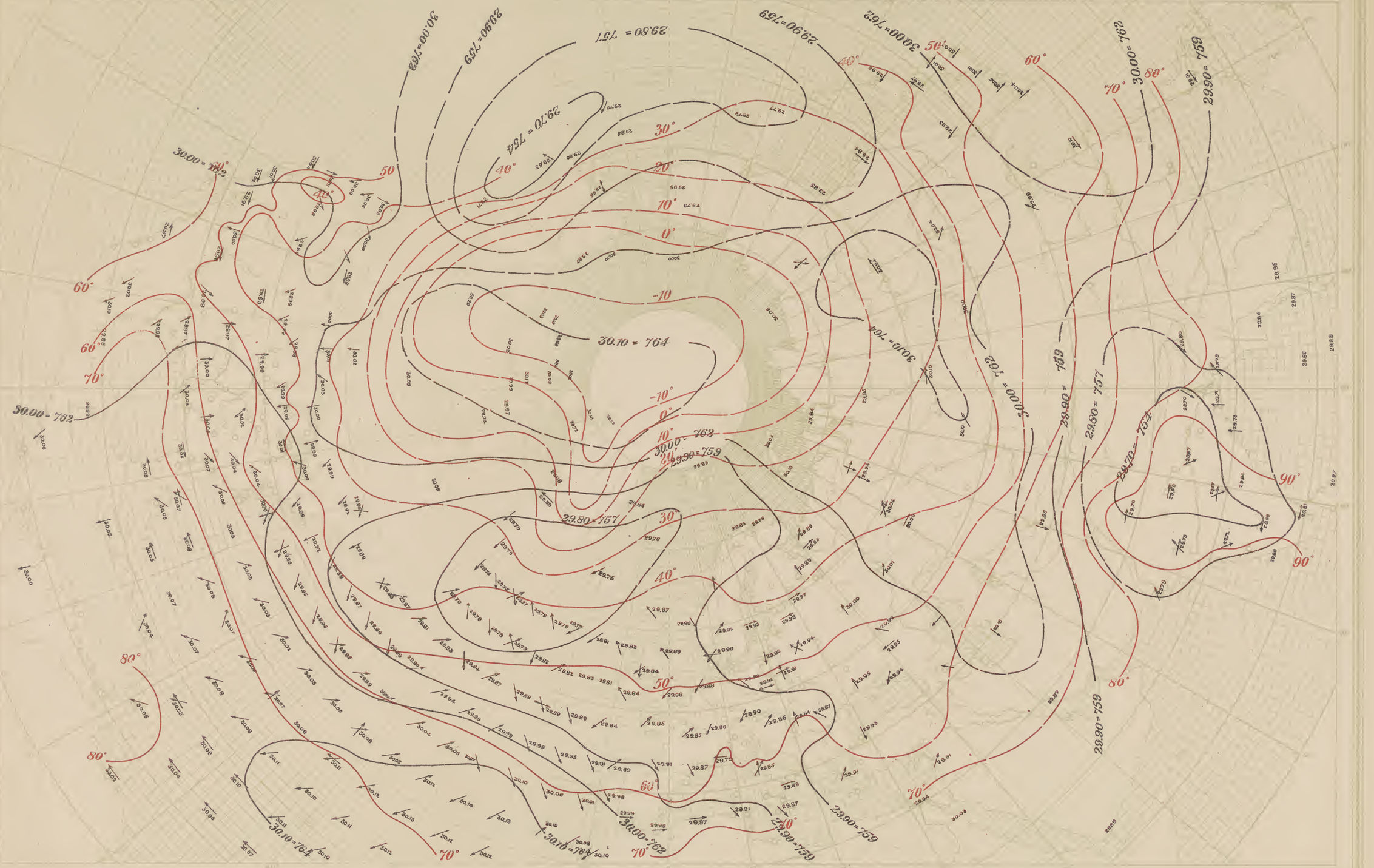


MARCH.

Normal Barometric Pressure and Prevailing Winds for the Northern Hemisphere, determined from International Simultaneous Meteorological Observations taken at noon (Greenwich time), from 1878 to 1887.

Normal Temperature for the Northern Hemisphere, determined from International Simultaneous Observations taken at noon (Greenwich time), from 1878 to 1887, inclusive.

CHART 5.—UNITED STATES DEPARTMENT OF AGRICULTURE, WEATHER BUREAU, WASHINGTON, D.C.

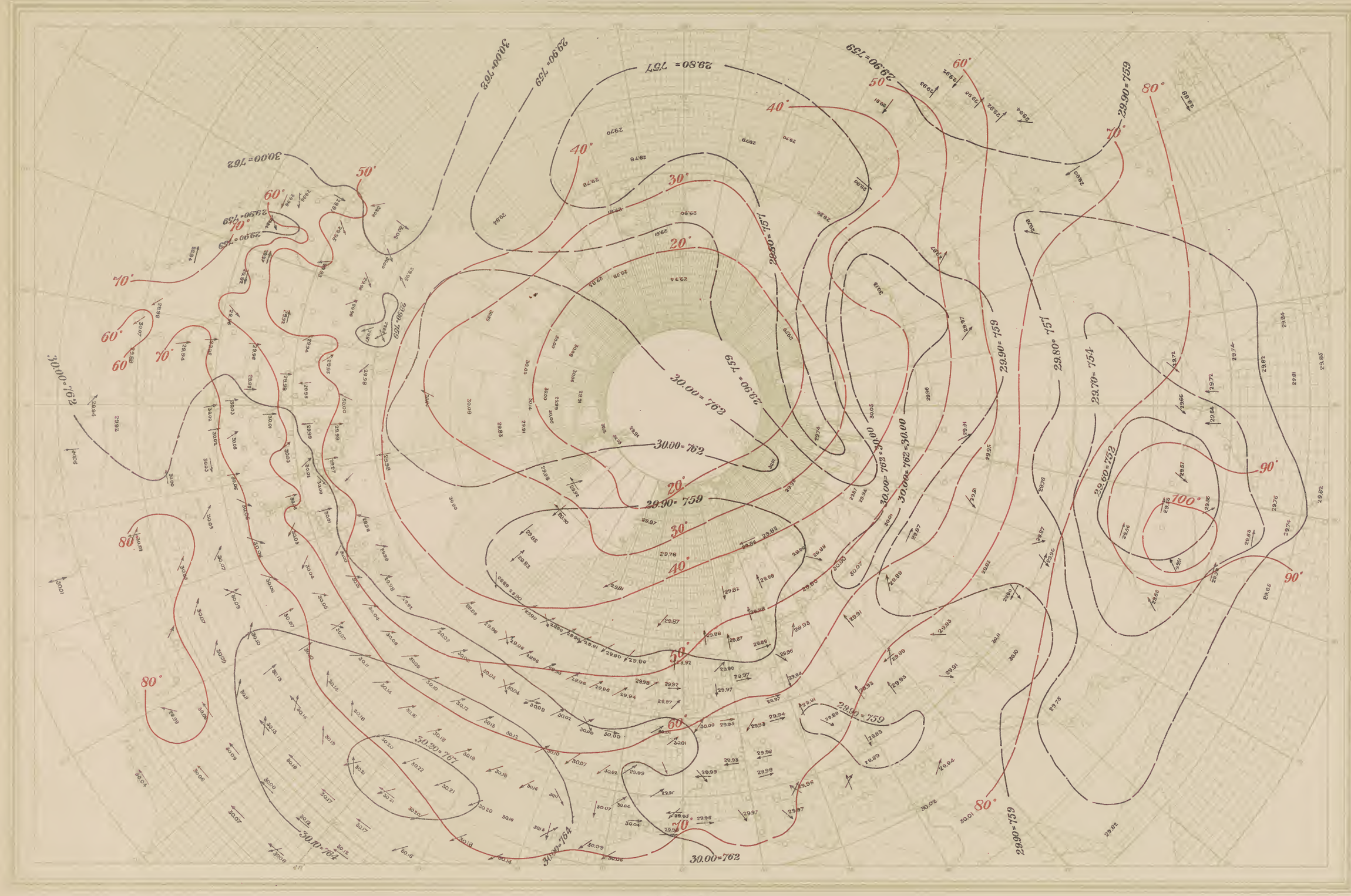


APRIL.

Normal Barometric Pressure and Prevailing Winds for the Northern Hemisphere, determined from International Simultaneous Meteorological Observations taken at noon (Greenwich time), from 1878 to 1887.

Normal Temperature for the Northern Hemisphere, determined from International Simultaneous Observations taken at noon (Greenwich time), from 1878 to 1887, inclusive.

CHART 6.—UNITED STATES DEPARTMENT OF AGRICULTURE, WEATHER BUREAU, WASHINGTON, D.C.

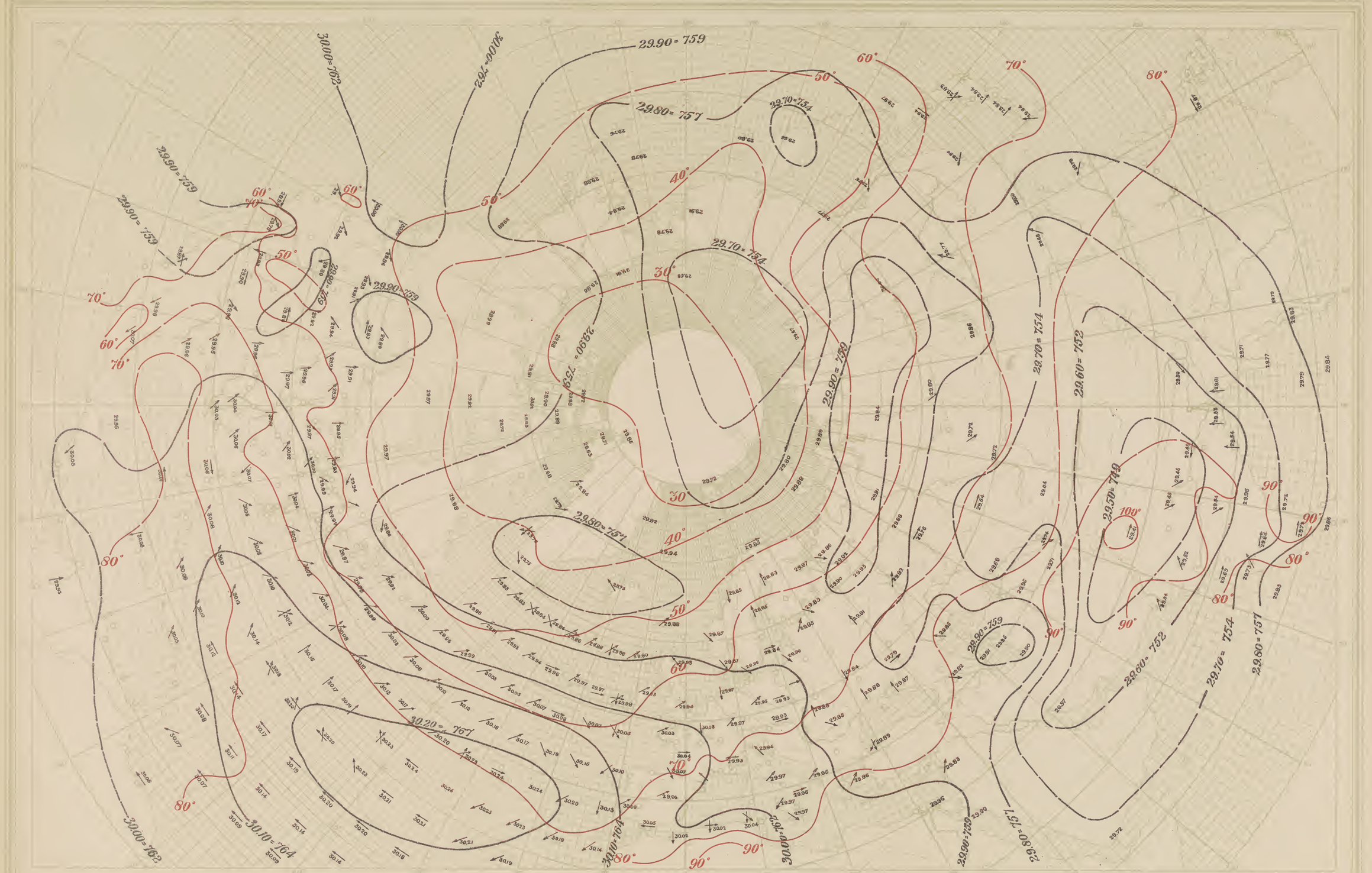


MAY.

Normal Barometric Pressure and Prevailing Winds for the Northern Hemisphere, determined from International Simultaneous Meteorological Observations taken at noon (Greenwich time), from 1878 to 1887.

Normal Temperature for the Northern Hemisphere, determined from International Simultaneous Observations taken at noon (Greenwich time), from 1878 to 1887, inclusive.

CHART 7.—UNITED STATES DEPARTMENT OF AGRICULTURE, WEATHER BUREAU, WASHINGTON, D.C.

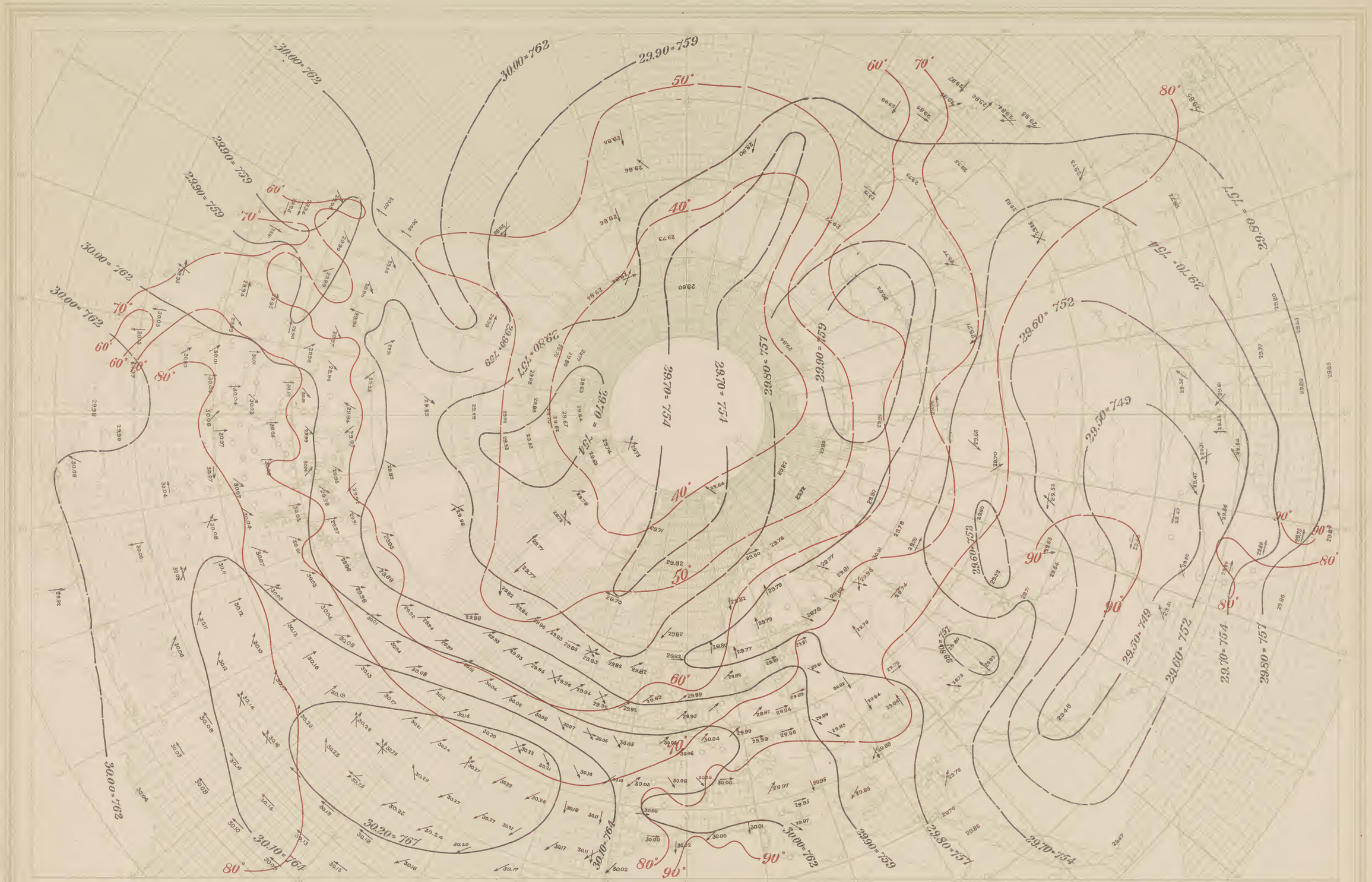


JUNE.

Normal Barometric Pressure and Prevailing Winds for the Northern Hemisphere, determined from International Simultaneous Meteorological Observations taken at noon (Greenwich time), from 1878 to 1887.

Normal Temperature for the Northern Hemisphere, determined from International Simultaneous Observations taken at noon (Greenwich time), from 1878 to 1887, inclusive.

CHART 8.—UNITED STATES DEPARTMENT OF AGRICULTURE, WEATHER BUREAU, WASHINGTON, D.C.

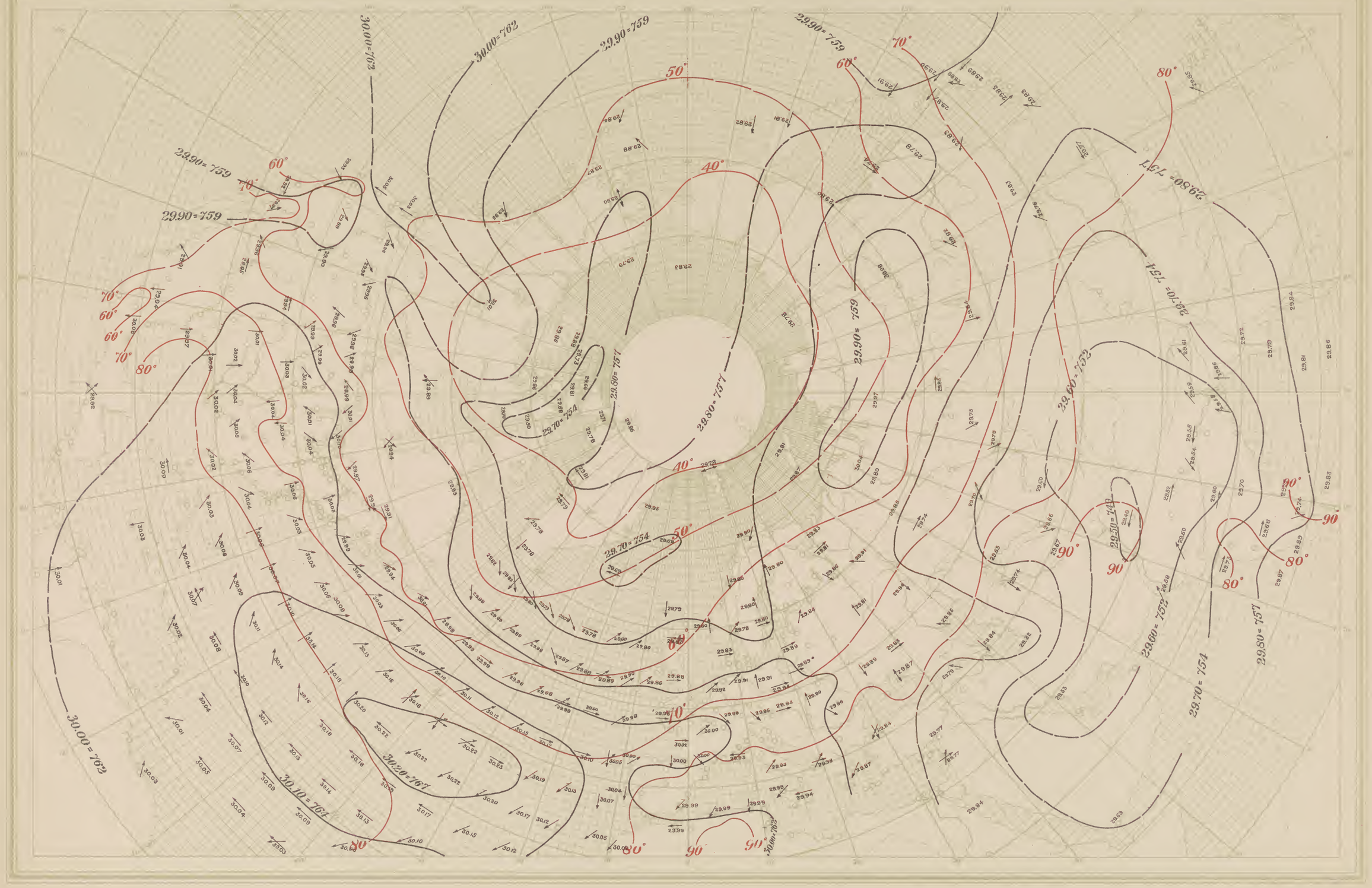


JULY.

Normal Barometric Pressure and Prevailing Winds for the Northern Hemisphere, determined from International Simultaneous Meteorological Observations taken at noon (Greenwich time), from 1878 to 1887.

Normal Temperature for the Northern Hemisphere, determined from International Simultaneous Observations taken at noon (Greenwich time), from 1878 to 1887, inclusive.

CHART 9.—UNITED STATES DEPARTMENT OF AGRICULTURE, WEATHER BUREAU, WASHINGTON, D.C.

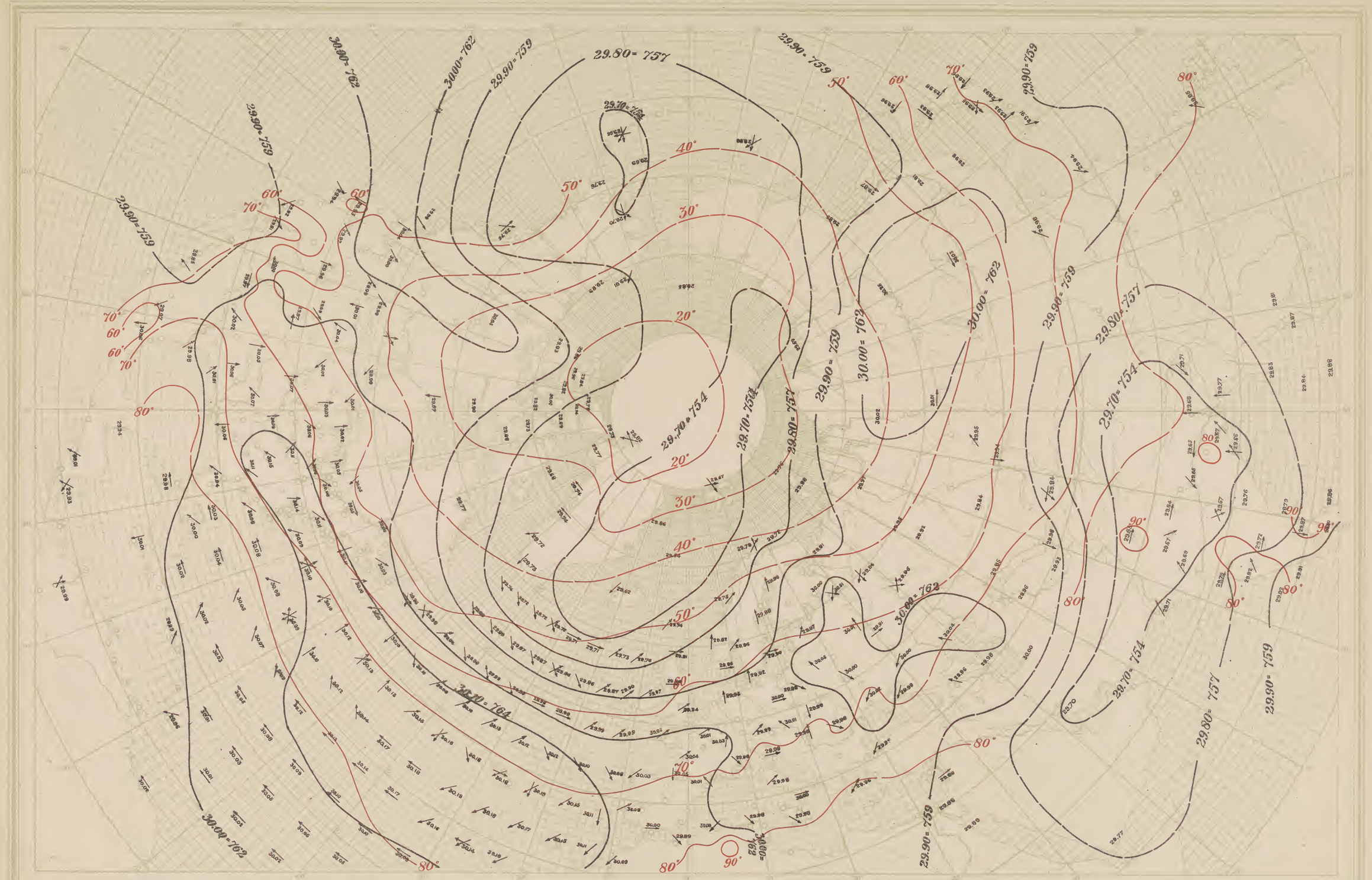


AUGUST.

Normal Barometric Pressure and Prevailing Winds for the Northern Hemisphere, determined from International Simultaneous Meteorological Observations taken at noon (Greenwich time), from 1878 to 1887.

Normal Temperature for the Northern Hemisphere, determined from International Simultaneous Observations taken at noon (Greenwich time), from 1878 to 1887, inclusive.

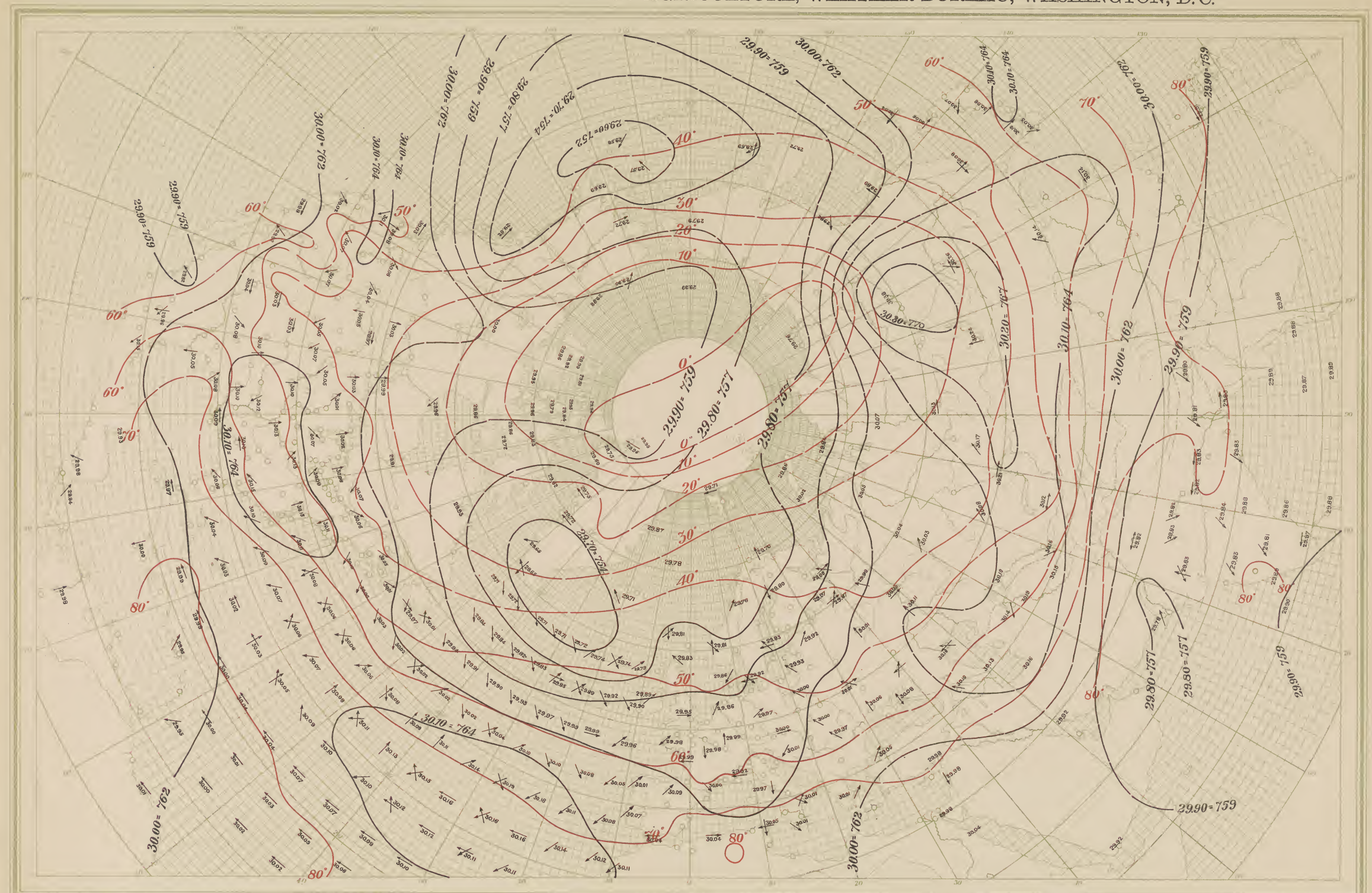
CHART 10.—UNITED STATES DEPARTMENT OF AGRICULTURE, WEATHER BUREAU, WASHINGTON, D. C.



SEPTEMBER.

Normal Barometric Pressure and Prevailing Winds for the Northern Hemisphere, determined from International Simultaneous Meteorological Observations taken at noon (Greenwich time), from 1878 to 1887.

Normal Temperature for the Northern Hemisphere, determined from International Simultaneous Observations taken at noon (Greenwich time), from 1878 to 1887, inclusive.

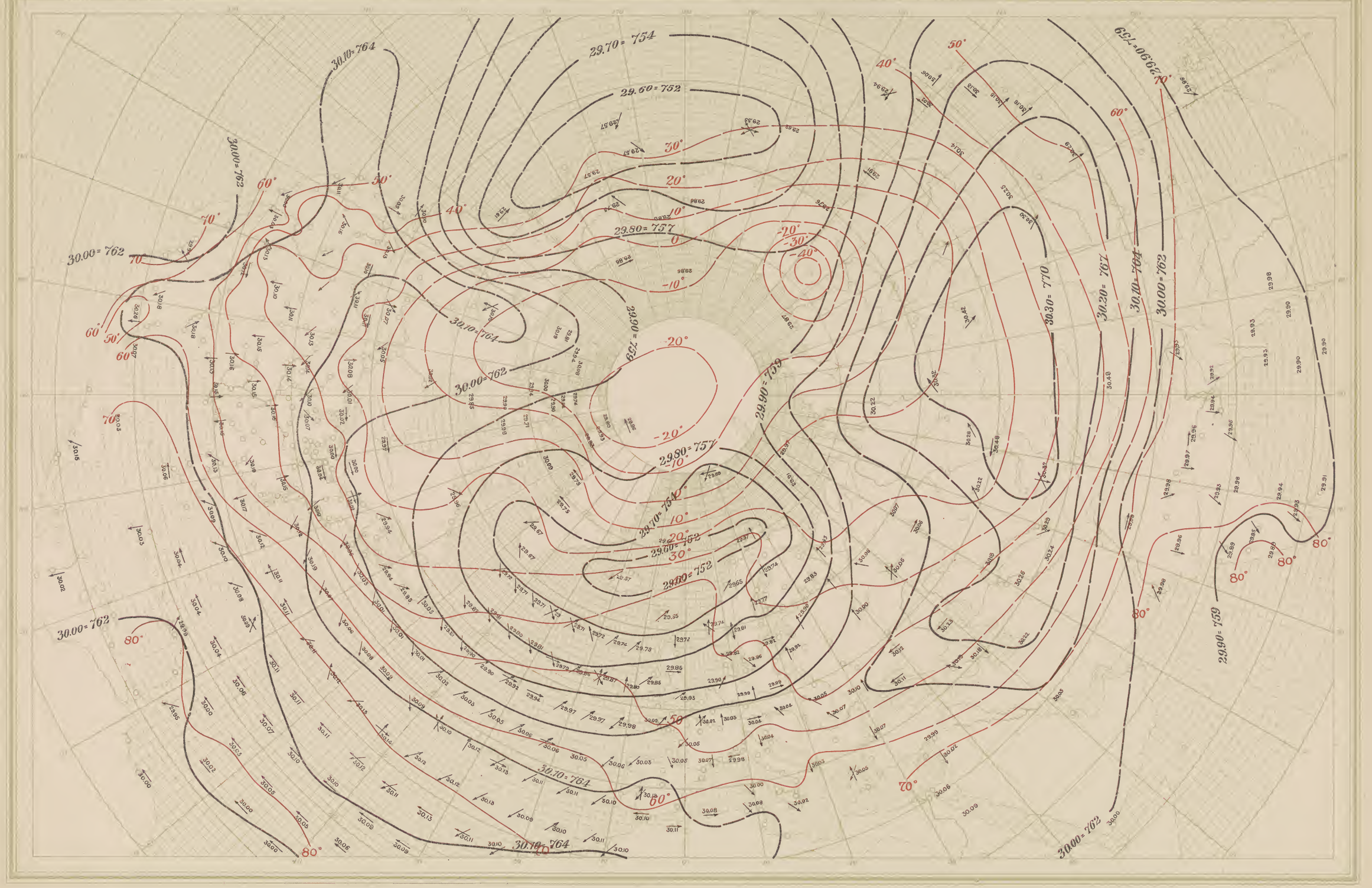


OCTOBER.

Normal Barometric Pressure and Prevailing Winds for the Northern Hemisphere, determined from International Simultaneous Meteorological Observations taken at noon (Greenwich time), from 1878 to 1887.

Normal Temperature for the Northern Hemisphere, determined from International Simultaneous Observations taken at noon (Greenwich time), from 1878 to 1887, inclusive.

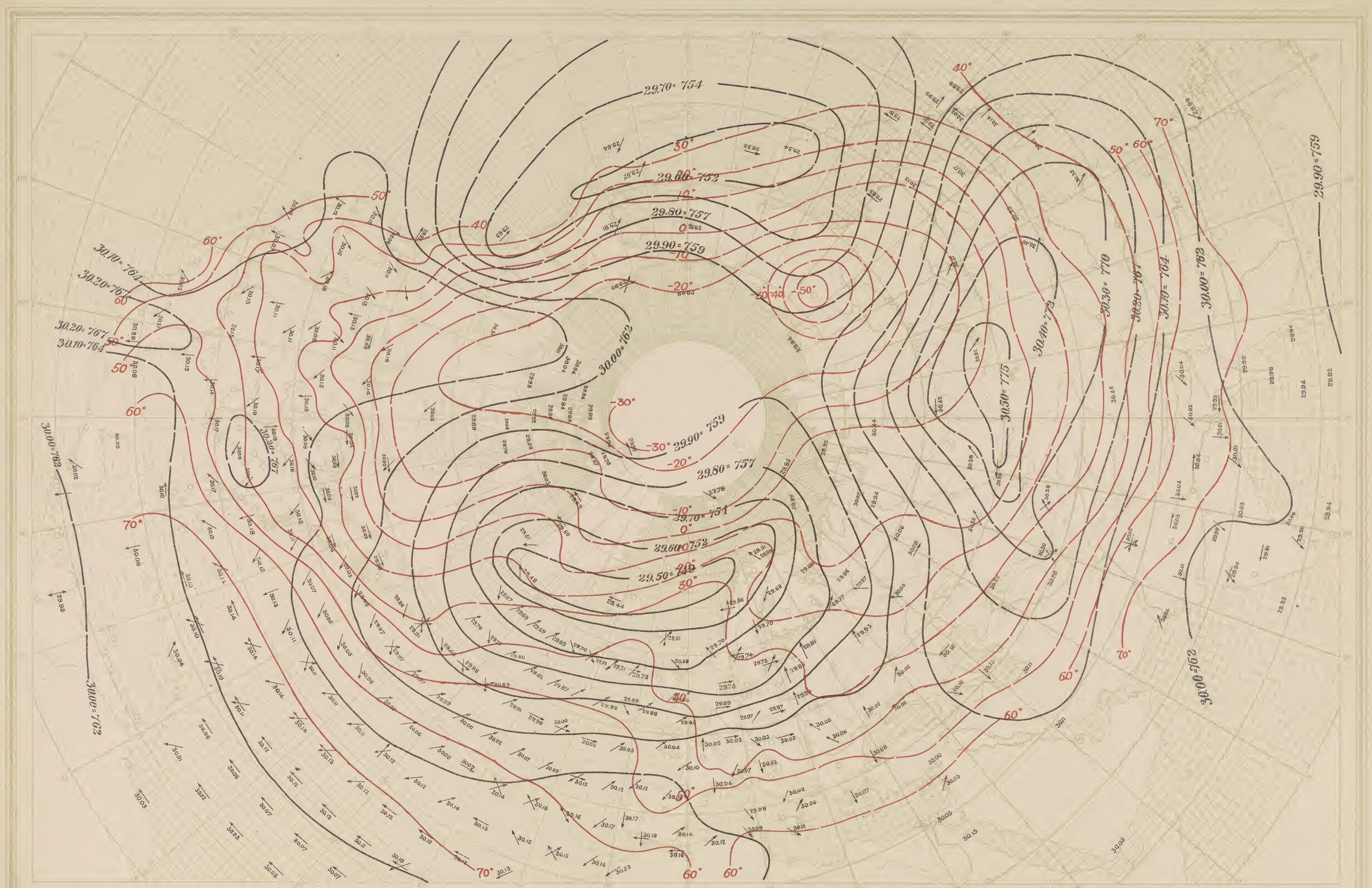
CHART 12.—UNITED STATES DEPARTMENT OF AGRICULTURE, WEATHER BUREAU, WASHINGTON, D.C.



NOVEMBER.

Normal Barometric Pressure and Prevailing Winds for the Northern Hemisphere, determined from International Simultaneous Meteorological Observations taken at noon (Greenwich time), from 1878 to 1887.

Normal Temperature for the Northern Hemisphere, determined from International Simultaneous Observations taken at noon (Greenwich time), from 1878 to 1887, inclusive.

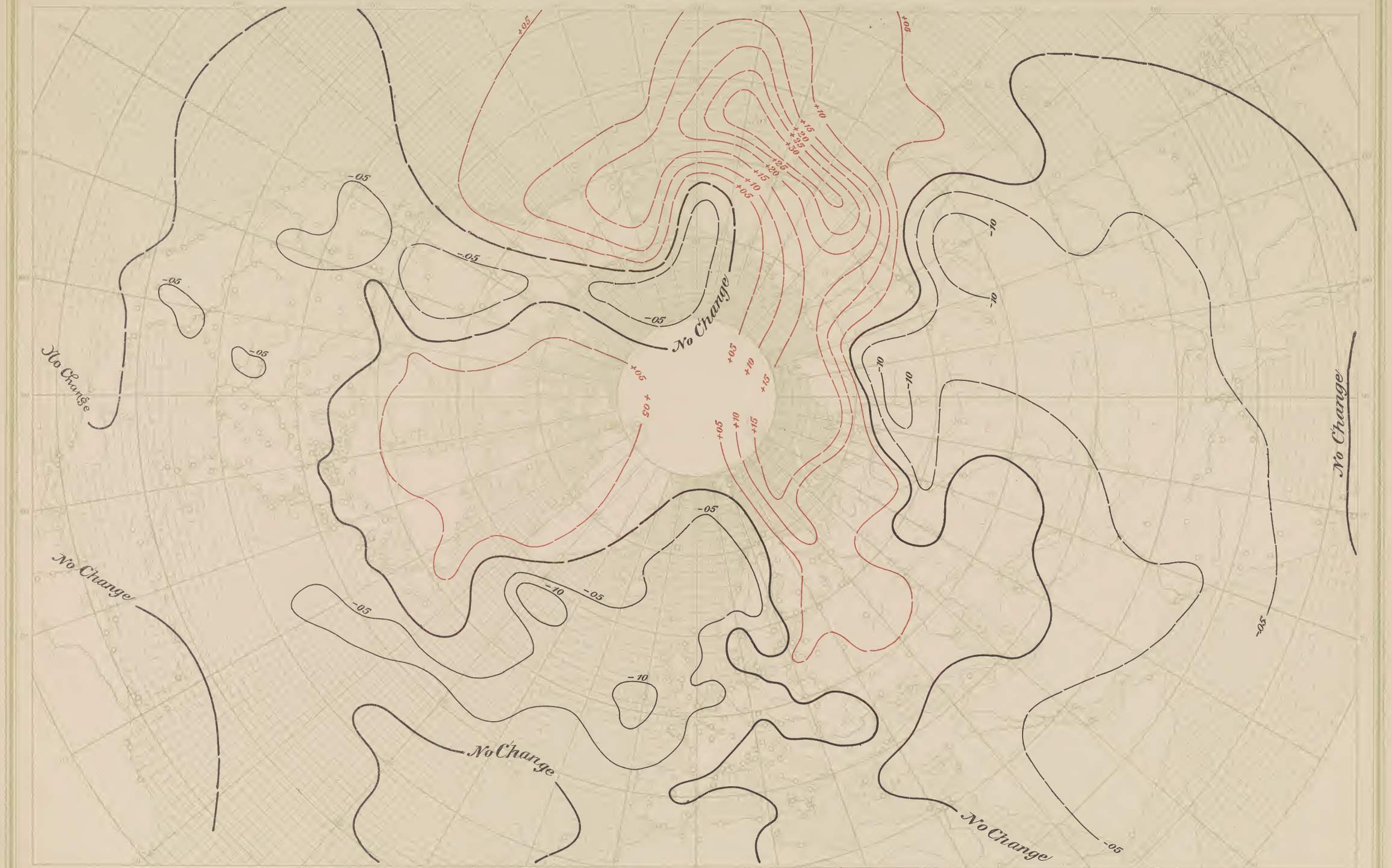


DECEMBER.

Normal Barometric Pressure and Prevailing Winds for the Northern Hemisphere, determined from International Simultaneous Meteorological Observations taken at noon (Greenwich time), from 1878 to 1887.

Normal Temperature for the Northern Hemisphere, determined from International Simultaneous Observations taken at noon (Greenwich time), from 1878 to 1887, inclusive.

CHART 14.—UNITED STATES DEPARTMENT OF AGRICULTURE, WEATHER BUREAU, WASHINGTON, D. C.



JANUARY TO FEBRUARY.

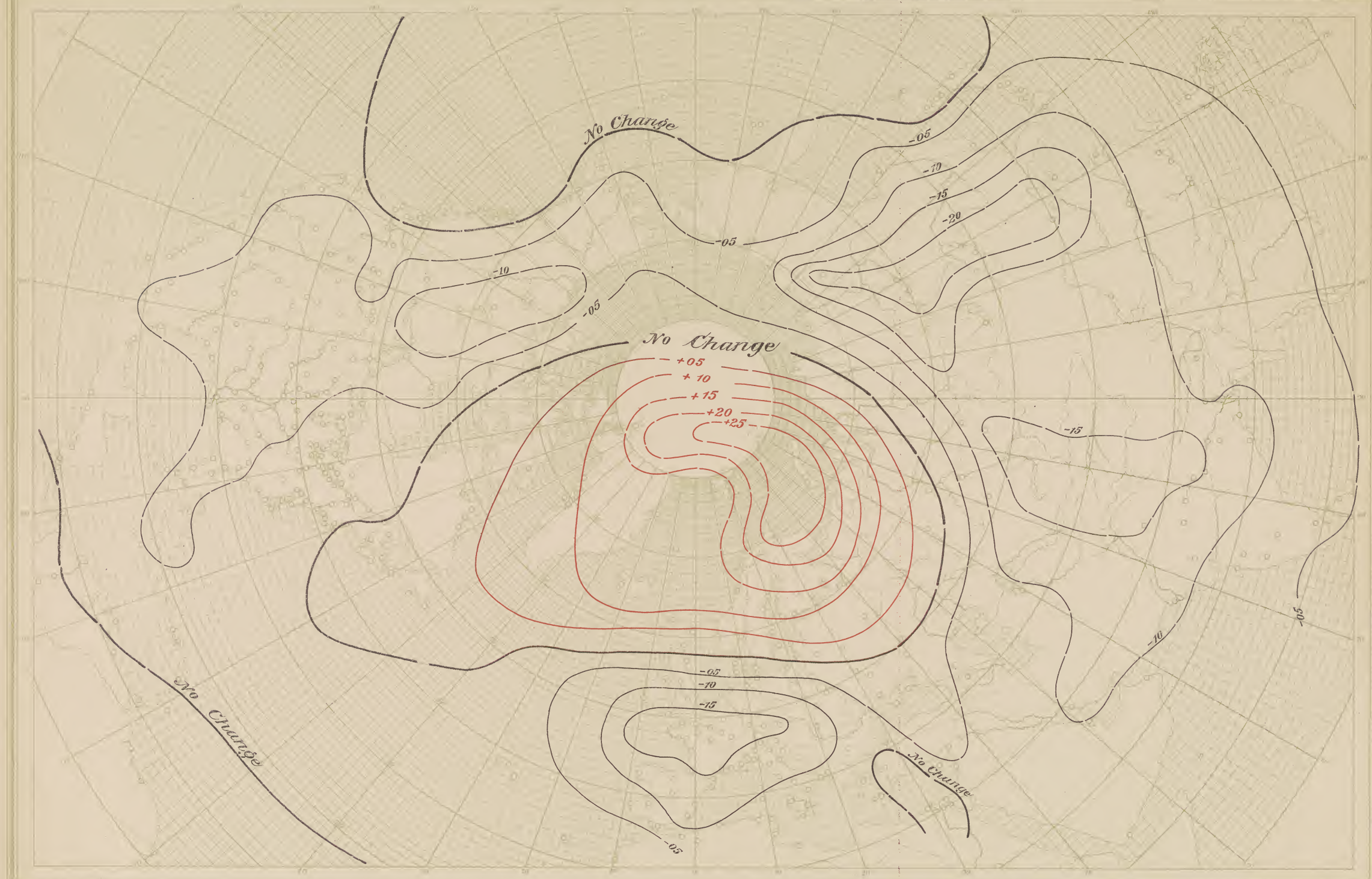
Normal Pressure Changes for the Northern Hemisphere, determined from International Simultaneous Meteorological Observations taken at noon (Greenwich time), from 1878 to 1887.

CHART 15.—UNITED STATES DEPARTMENT OF AGRICULTURE, WEATHER BUREAU, WASHINGTON, D.C.

FEBRUARY TO MARCH.

Normal Pressure Changes for the Northern Hemisphere, determined from International Simultaneous Meteorological Observations taken at noon (Greenwich time), from 1878 to 1887.

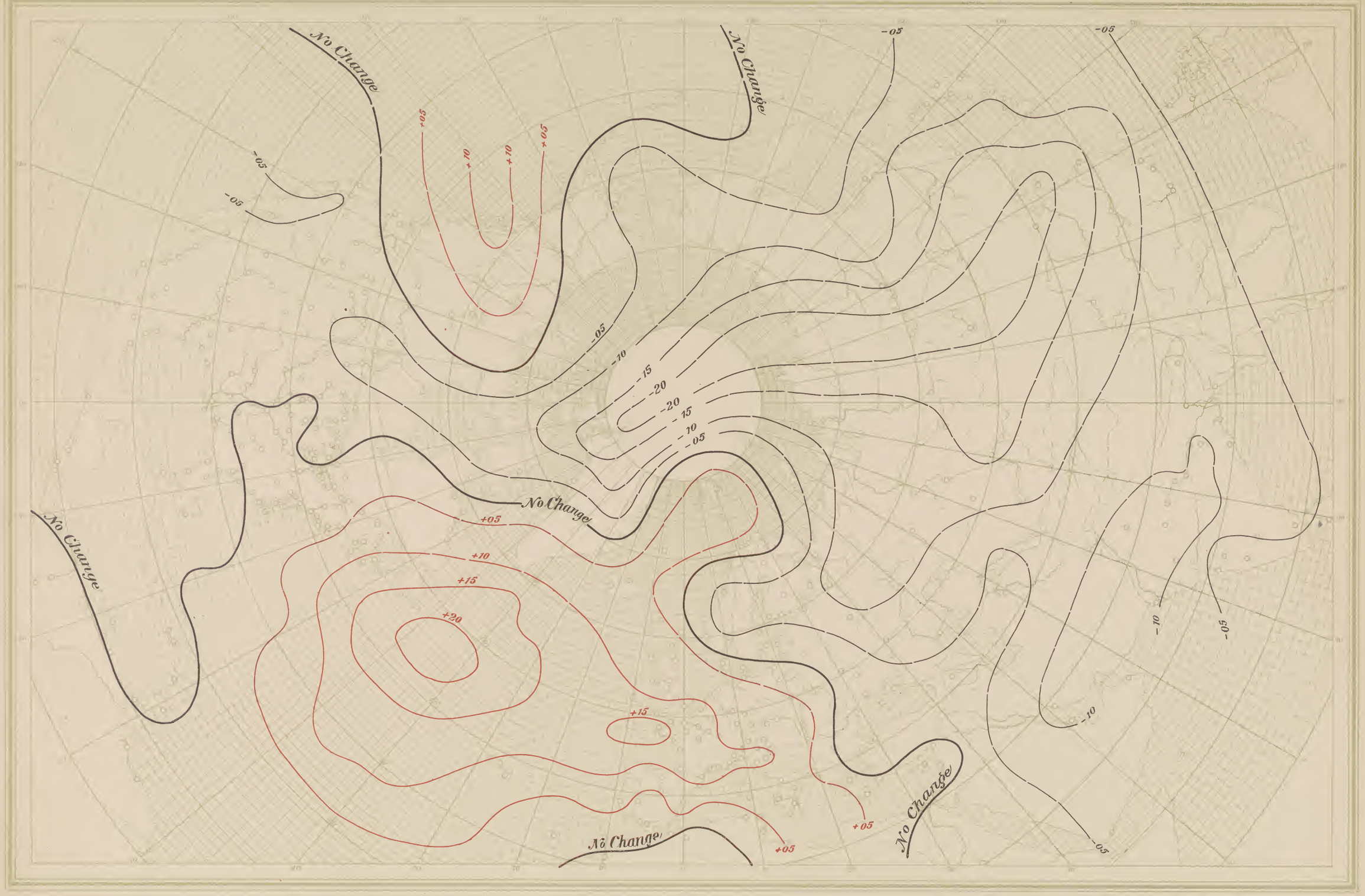
CHART 16.—UNITED STATES DEPARTMENT OF AGRICULTURE, WEATHER BUREAU, WASHINGTON, D.C.



MARCH TO APRIL.

Normal Pressure Changes for the Northern Hemisphere, determined from International Simultaneous Meteorological Observations taken at noon (Greenwich time), from 1878 to 1887.

CHART 17.—UNITED STATES DEPARTMENT OF AGRICULTURE, WEATHER BUREAU, WASHINGTON, D. C.



APRIL TO MAY.

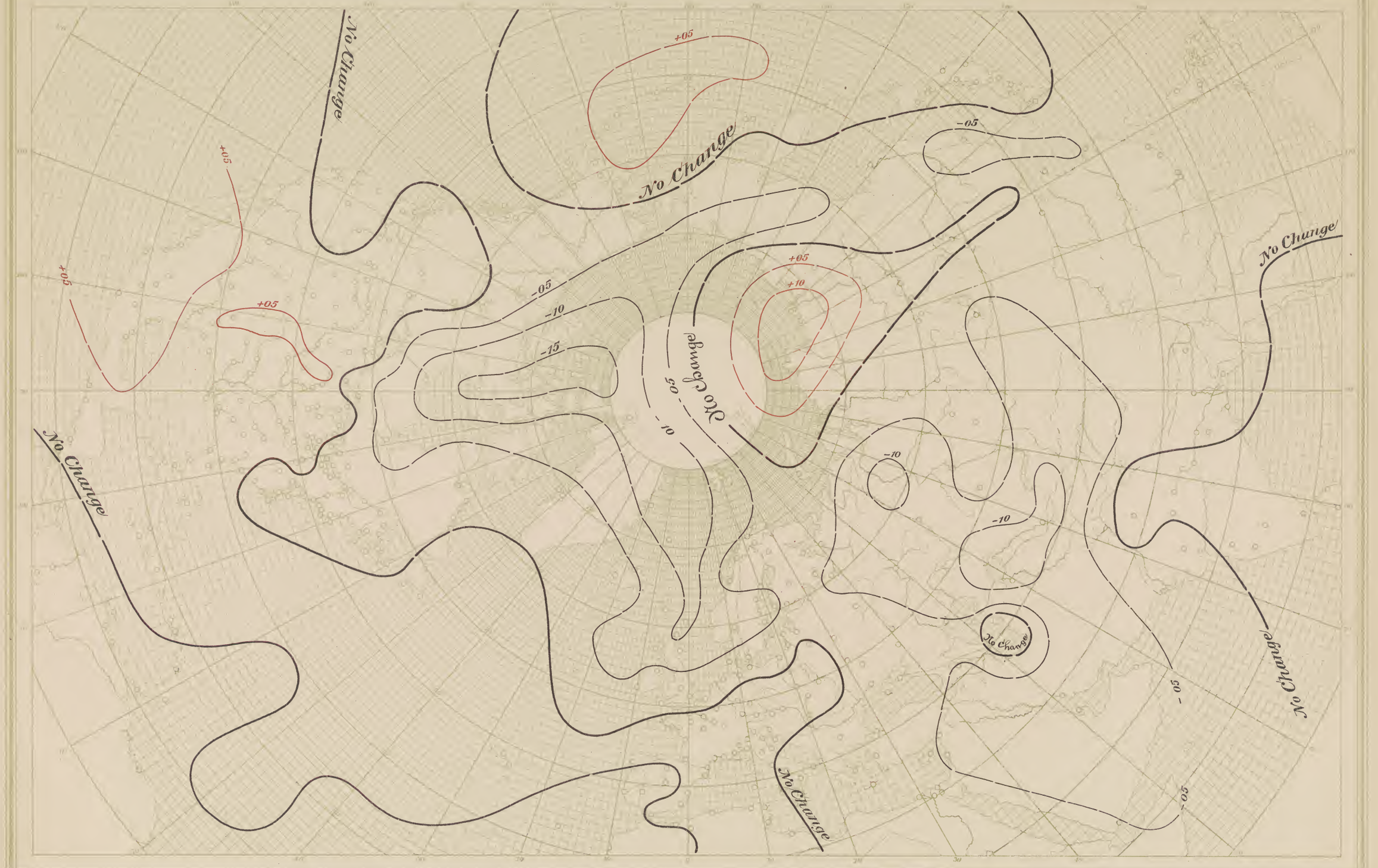
Normal Pressure Changes for the Northern Hemisphere, determined from International Simultaneous Meteorological Observations taken at noon (Greenwich time), from 1878 to 1887.

CHART 18.—UNITED STATES DEPARTMENT OF AGRICULTURE, WEATHER BUREAU, WASHINGTON, D.C.

MAY TO JUNE.

Normal Pressure Changes for the Northern Hemisphere, determined from International Simultaneous Meteorological Observations taken at noon (Greenwich time), from 1873 to 1887.

CHART 19.—UNITED STATES DEPARTMENT OF AGRICULTURE, WEATHER BUREAU, WASHINGTON, D.C.



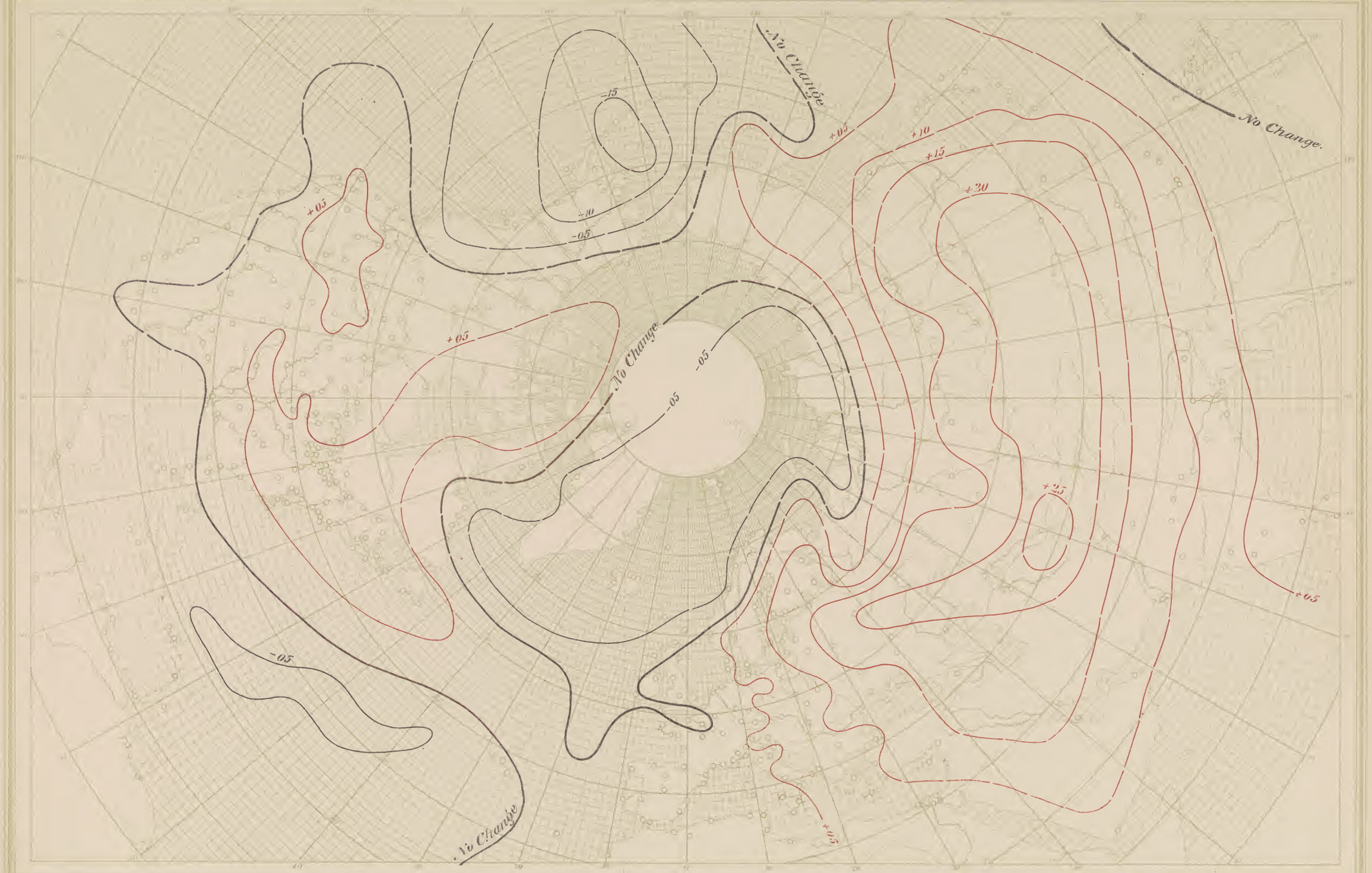
JUNE TO JULY.

Normal Pressure Changes for the Northern Hemisphere, determined from International Simultaneous Meteorological Observations taken at noon (Greenwich time), from 1878 to 1887.

CHART 20.—UNITED STATES DEPARTMENT OF AGRICULTURE, WEATHER BUREAU, WASHINGTON, D.C.

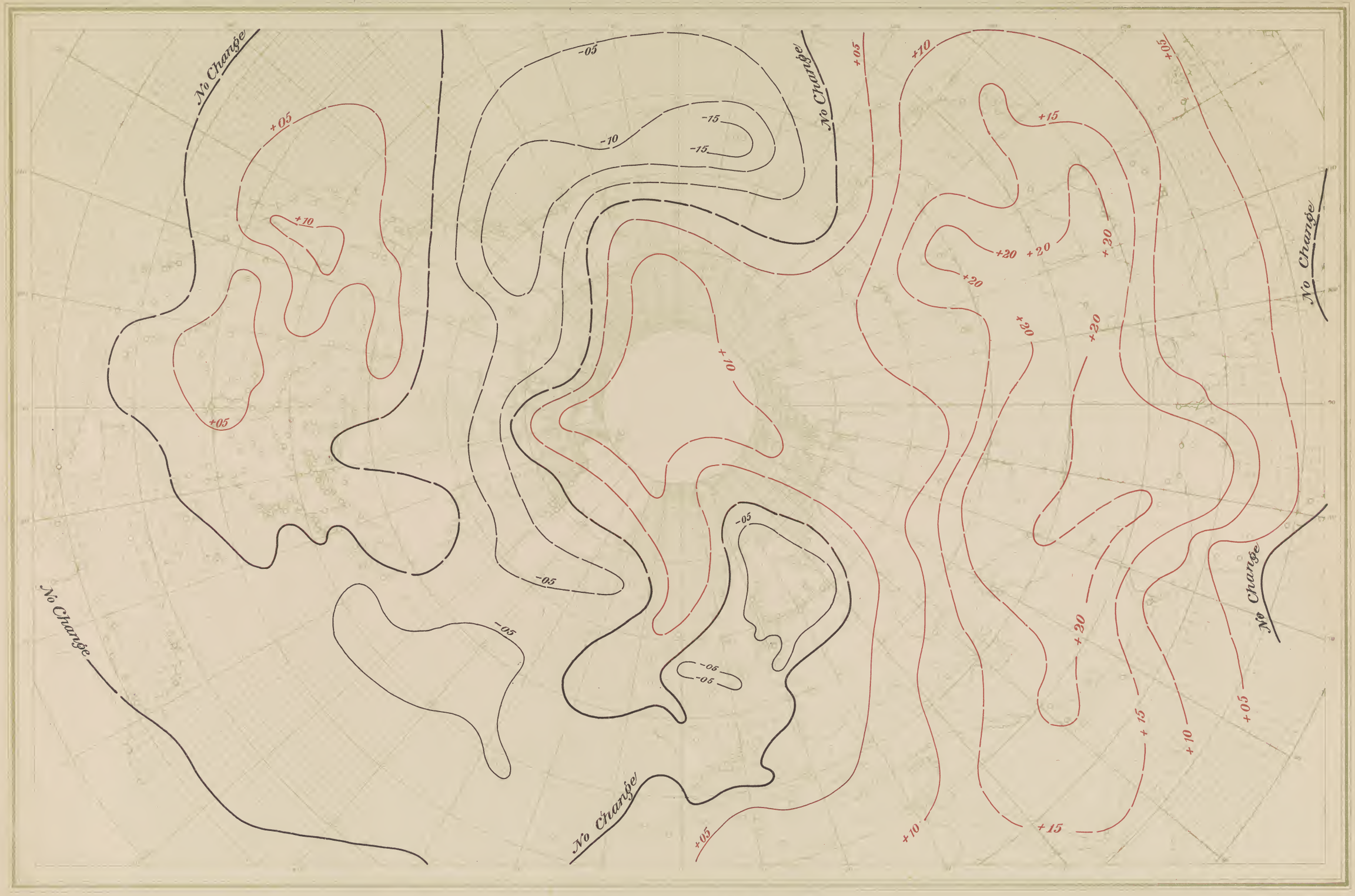
JULY TO AUGUST.

Normal Pressure Changes for the Northern Hemisphere, determined from International Simultaneous Meteorological Observations taken at noon (Greenwich time), from 1878 to 1887.



AUGUST TO SEPTEMBER.

Normal Pressure Changes for the Northern Hemisphere, determined from International Simultaneous Meteorological Observations taken at noon (Greenwich time), from 1878 to 1887.



SEPTEMBER TO OCTOBER.

Normal Pressure Changes for the Northern Hemisphere, determined from International Simultaneous Meteorological Observations taken at noon (Greenwich time), from 1878 to 1887.

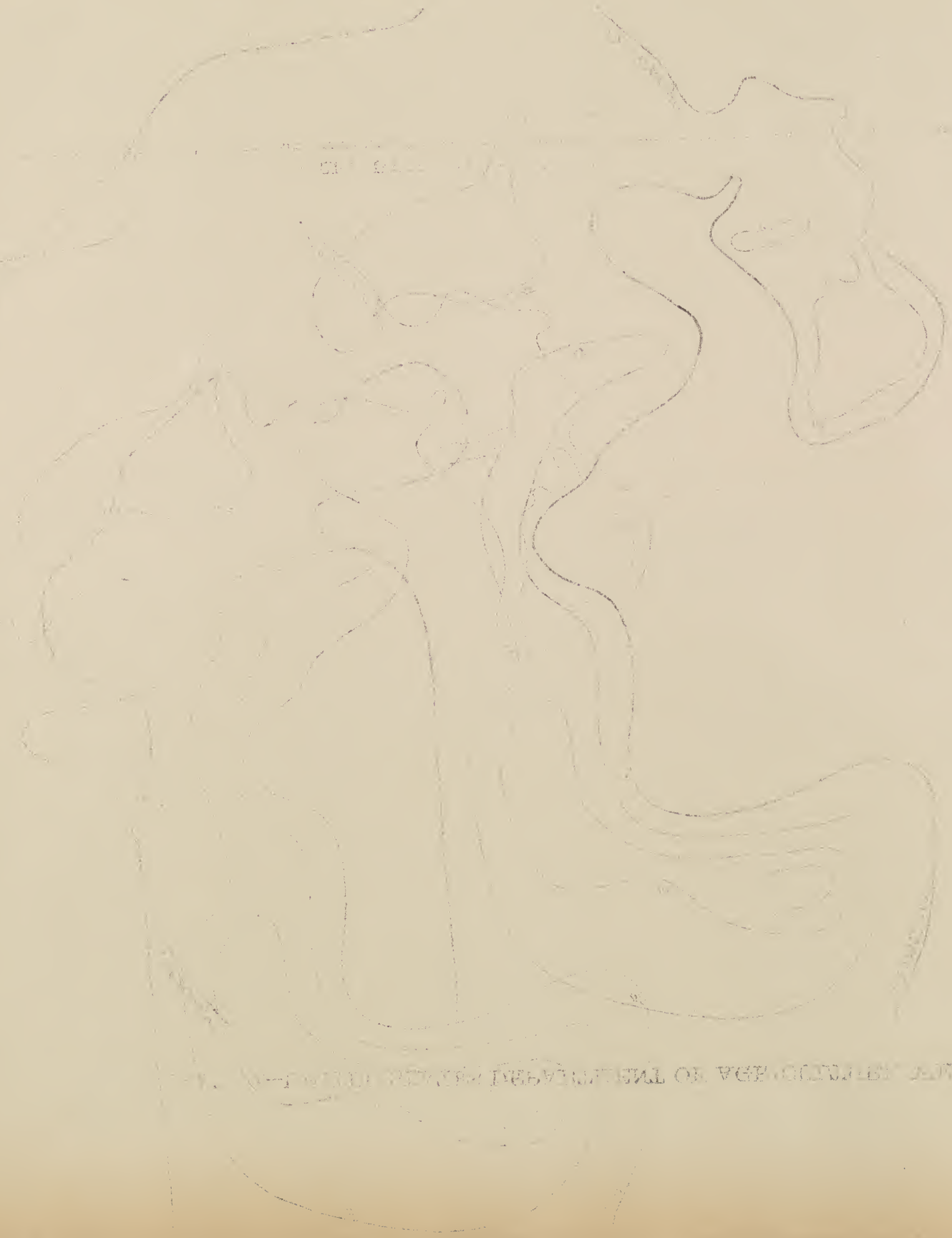
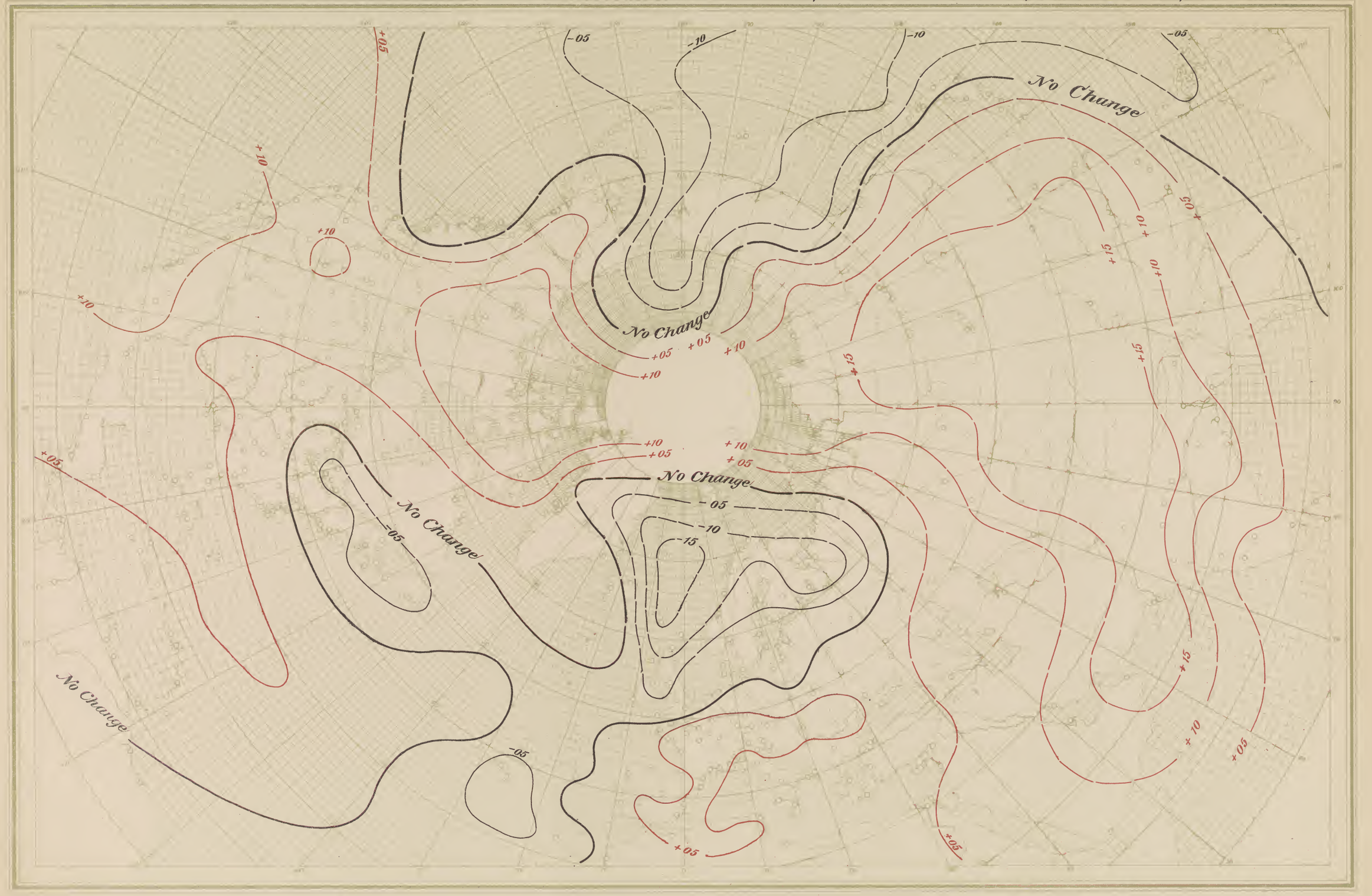


CHART 23.—UNITED STATES DEPARTMENT OF AGRICULTURE, WEATHER BUREAU, WASHINGTON, D.C.



OCTOBER TO NOVEMBER.

Normal Pressure Changes for the Northern Hemisphere, determined from International Simultaneous Meteorological Observations taken at noon (Greenwich time), from 1878 to 1887.

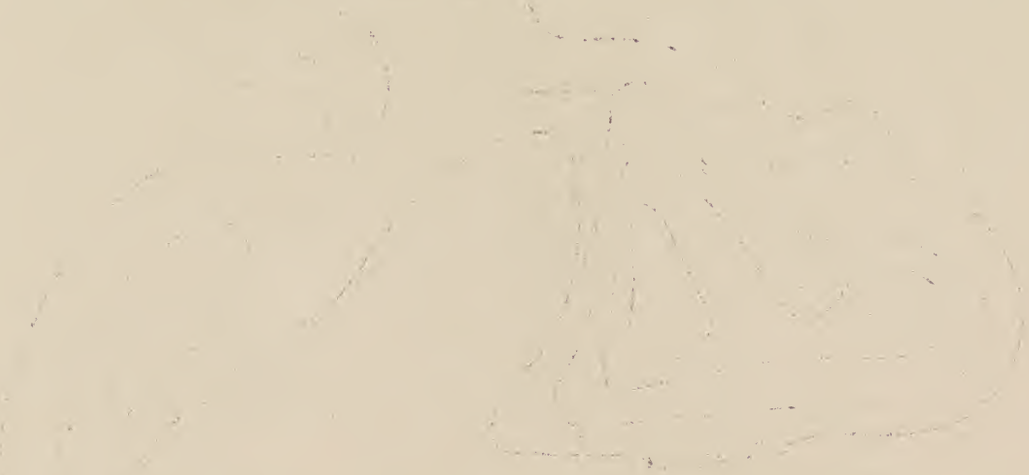
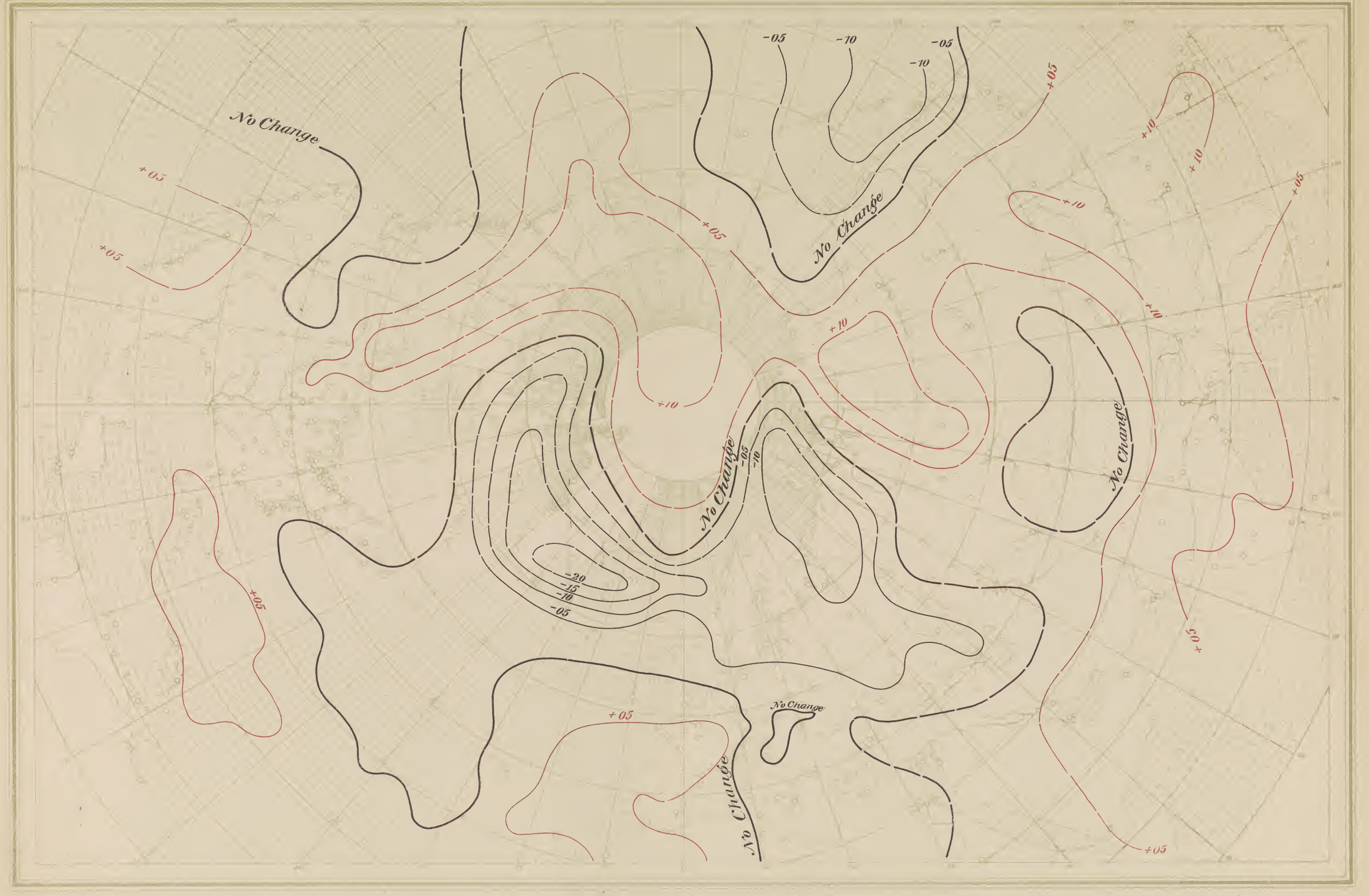


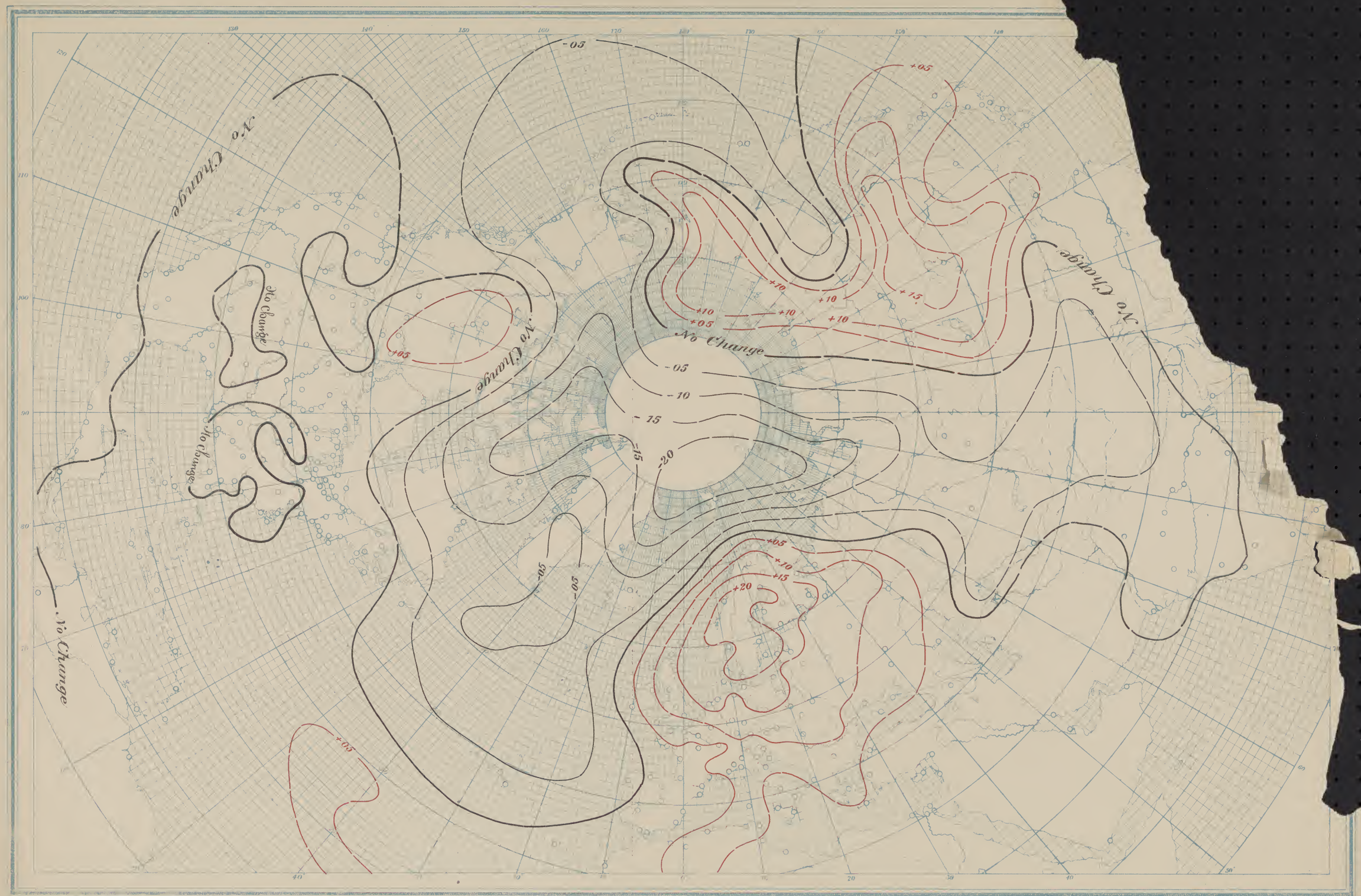
CHART 24.—UNITED STATES DEPARTMENT OF AGRICULTURE, WEATHER BUREAU, WASHINGTON, D. C.



NOVEMBER TO DECEMBER.

Normal Pressure Changes for the Northern Hemisphere, determined from International Simultaneous Meteorological Observations taken at noon (Greenwich time), from 1878 to 1887.

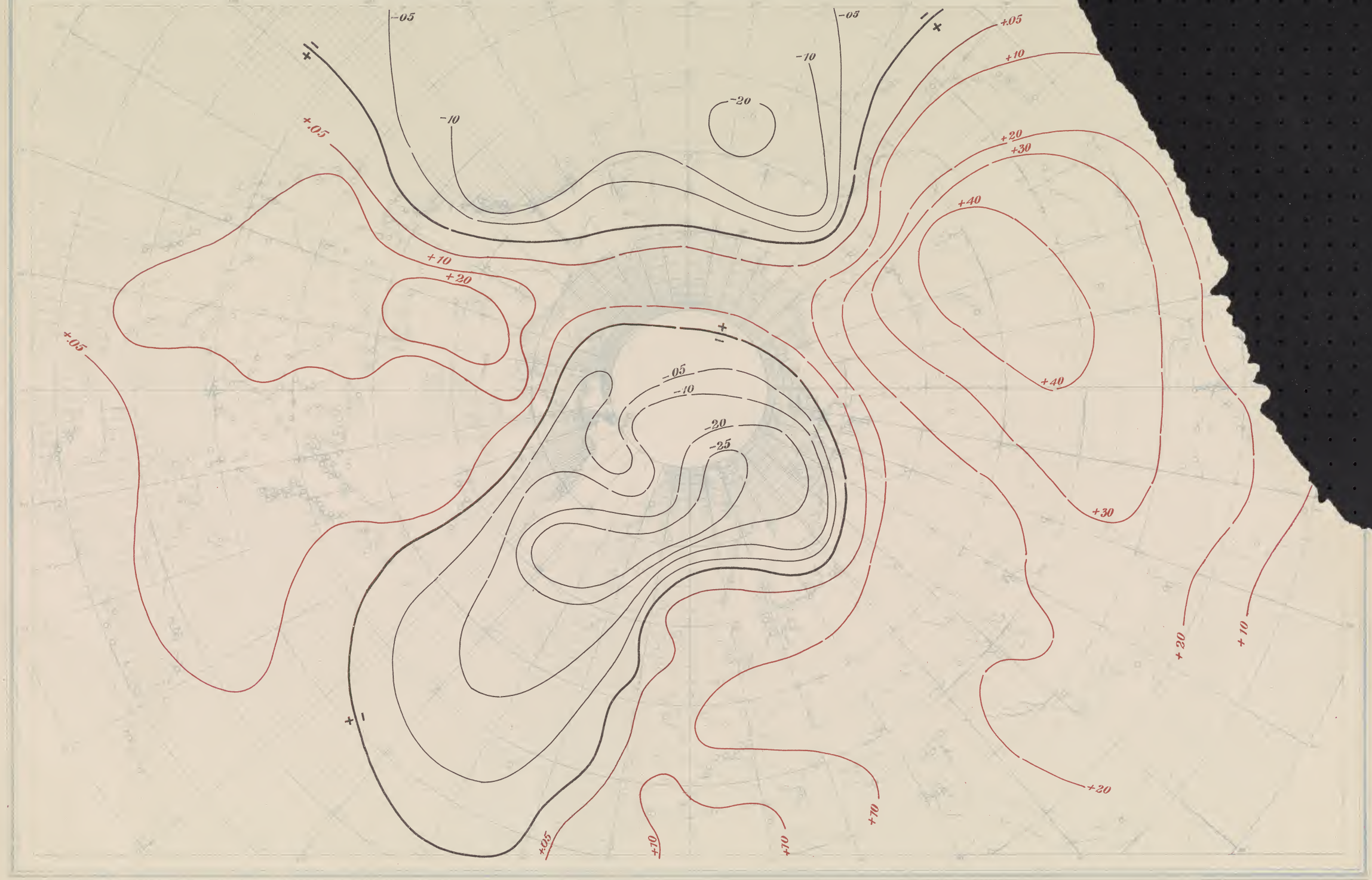
CHART 25.—UNITED STATES DEPARTMENT OF AGRICULTURE, WEATHER BUREAU, WASH



DECEMBER TO JANUARY.

Normal Pressure Changes for the Northern Hemisphere, determined from International Simultaneous Meteorological Observations taken at noon (Greenwich time), from 1878 to 1887.

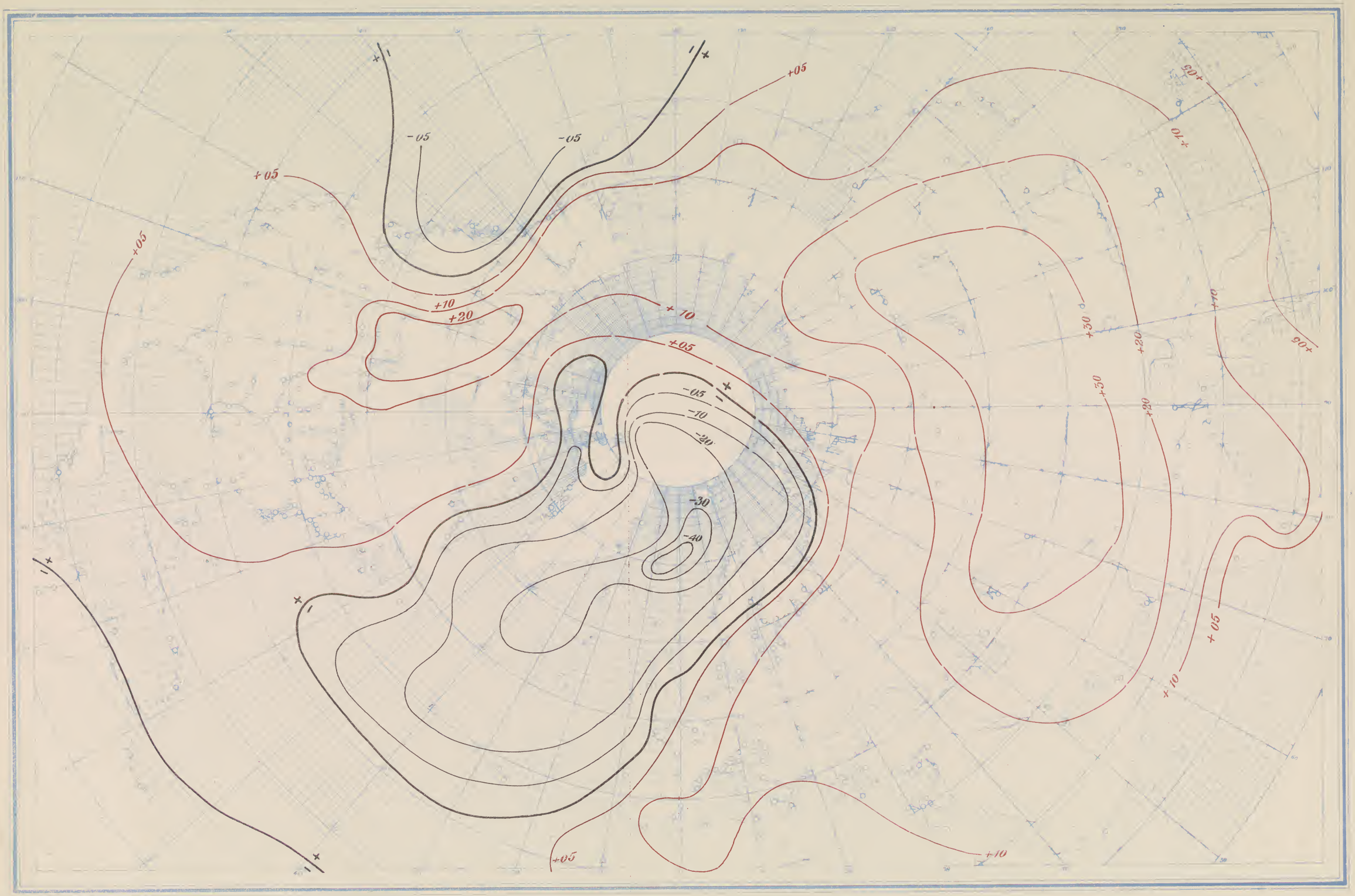
CHART 26.—UNITED STATES DEPARTMENT OF AGRICULTURE, WEATHER BUREAU, WA



JANUARY.

Departure of Monthly Normal Pressure from Annual Normal Pressure for the Northern Hemisphere, determined from International Simultaneous Meteorological Observations taken at noon (Greenwich time), from 1878 to 1887.

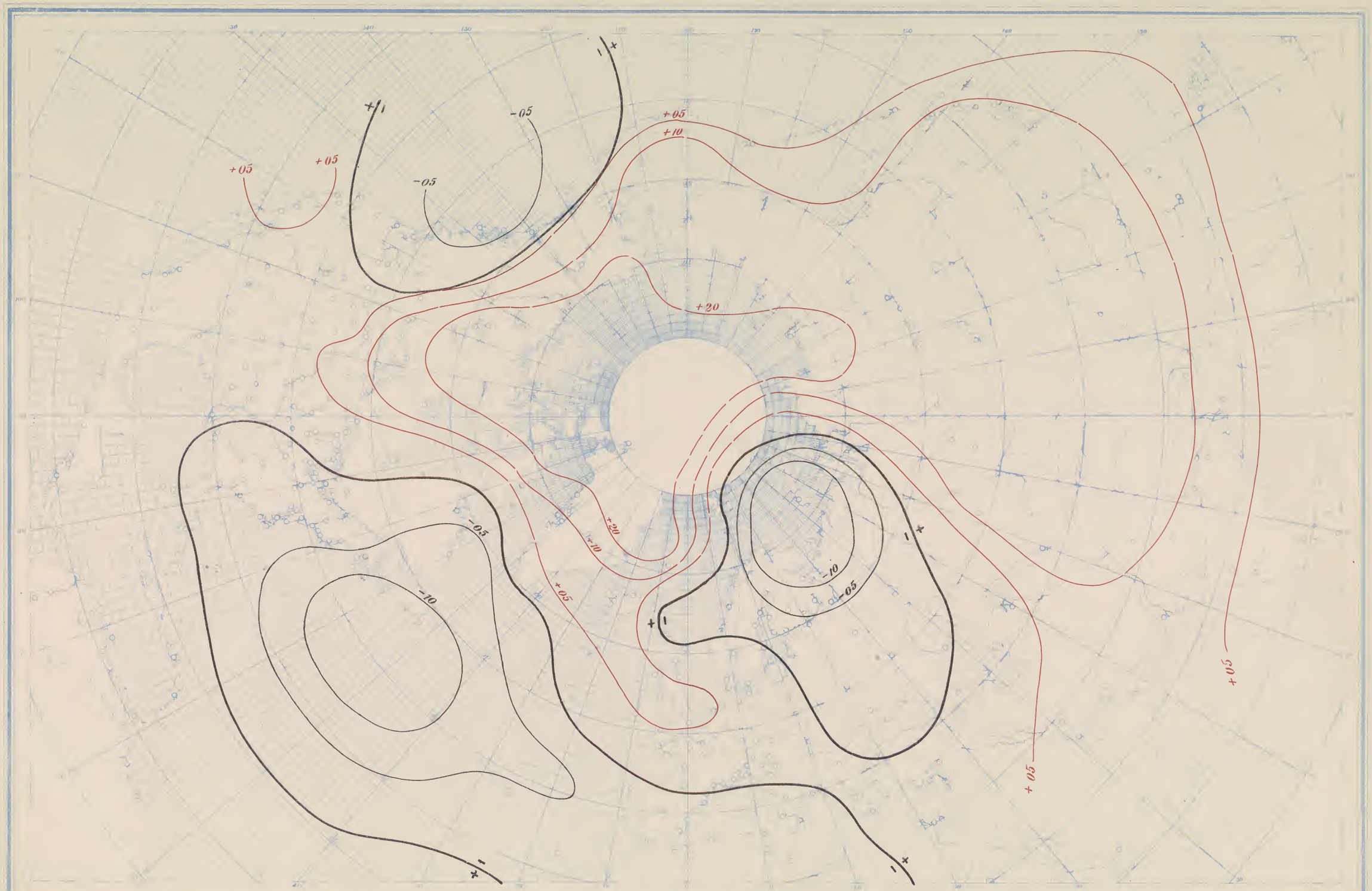
CHART 27.—UNITED STATES DEPARTMENT OF AGRICULTURE, WEATHER BUREAU, WASHINGTON, D.C.



FEBRUARY.

Departure of Monthly Normal Pressure from Annual Normal Pressure for the Northern Hemisphere, determined from International Simultaneous Meteorological Observations taken at noon (Greenwich time), from 1878 to 1887.

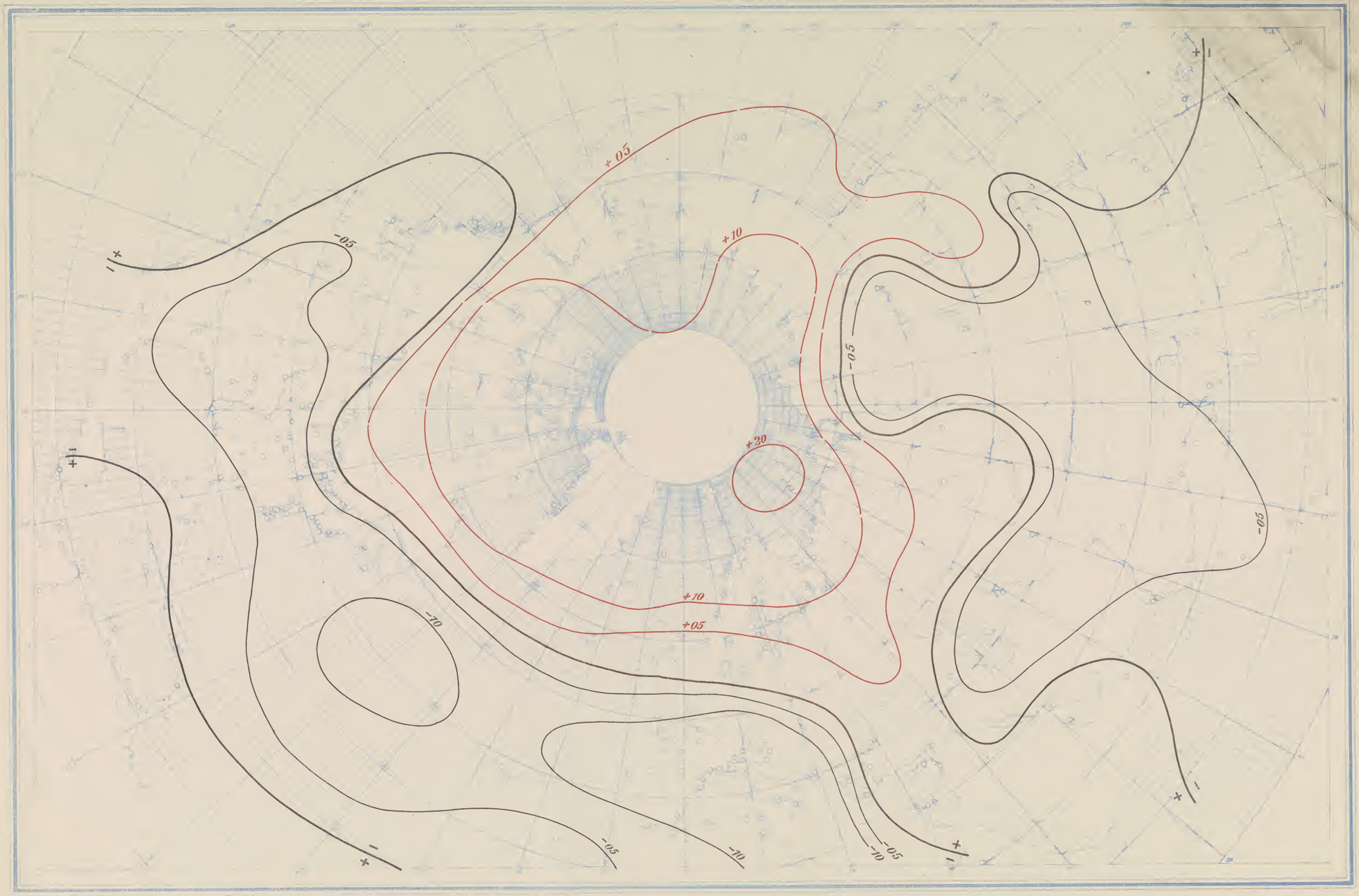
CHART 28.—UNITED STATES DEPARTMENT OF AGRICULTURE, WEATHER BUREAU, WASHINGTON, D.C.



MARCH.

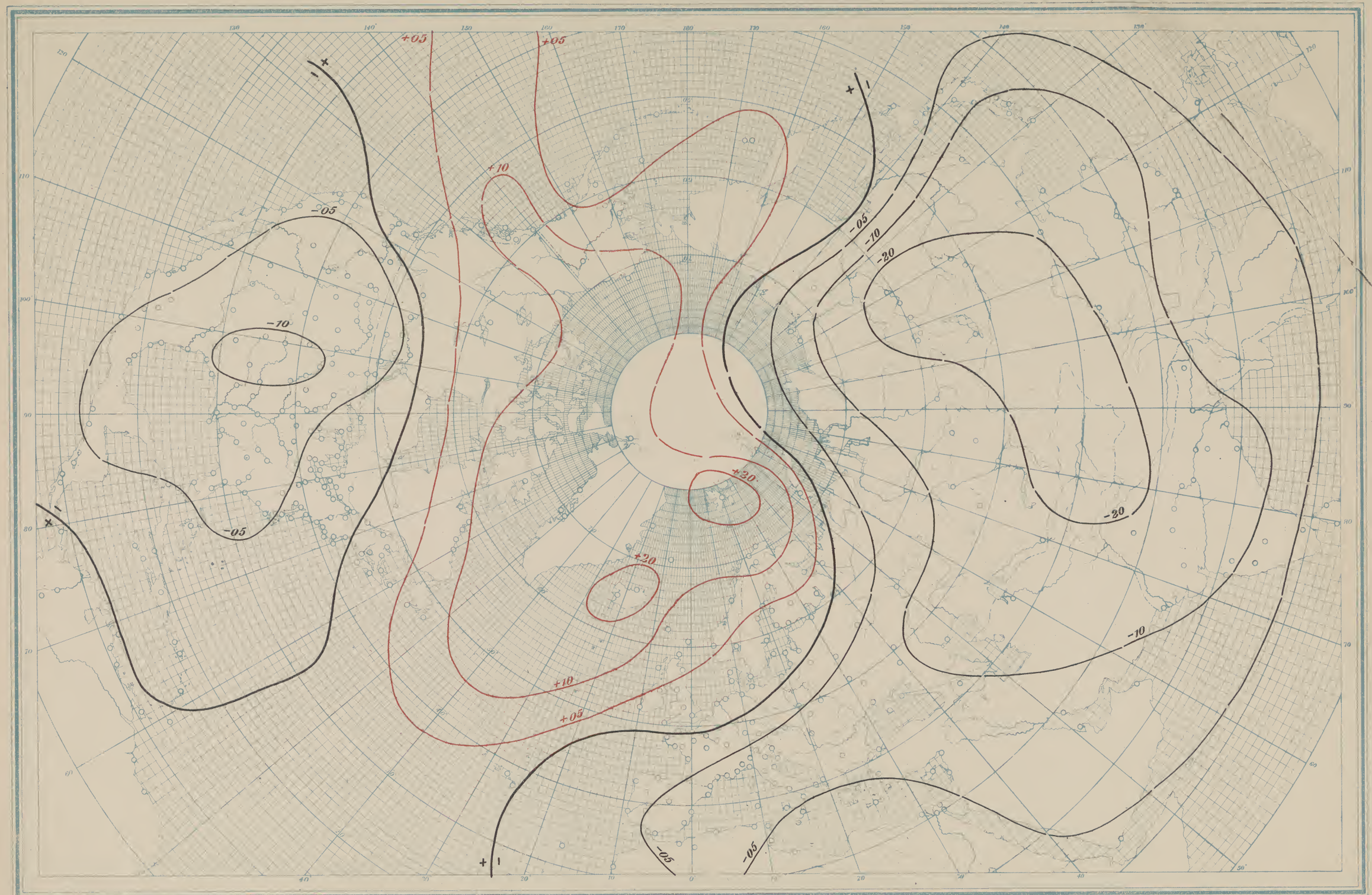
Departure of Monthly Normal Pressure from Annual Normal Pressure for the Northern Hemisphere, determined from International Simultaneous Meteorological Observations taken at noon (Greenwich time), from 1878 to 1887.

CHART 29.—UNITED STATES DEPARTMENT OF AGRICULTURE, WEATHER BUREAU, WASHINGTON, D.C.



APRIL.

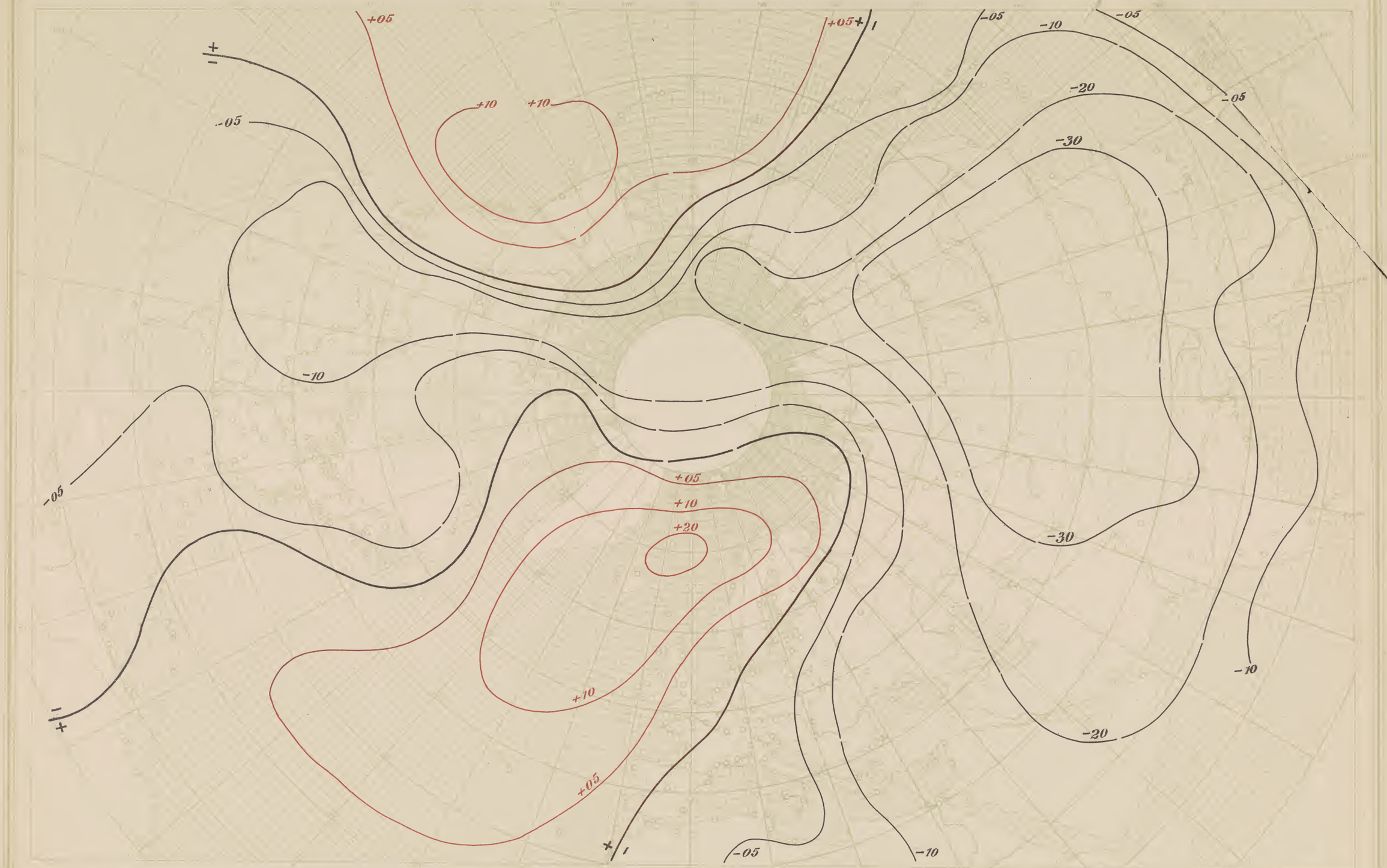
Departure of Monthly Normal Pressure from Annual Normal Pressure for the Northern Hemisphere, determined from International Simultaneous Meteorological Observations taken at noon (Greenwich time), from 1878 to 1887.



MAY.

Departure of Monthly Normal Pressure from Annual Normal Pressure for the Northern Hemisphere, determined from International Simultaneous Meteorological Observations taken at noon (Greenwich time), from 1878 to 1887.

CHART 31.—UNITED STATES DEPARTMENT OF AGRICULTURE, WEATHER BUREAU, WASHINGTON, D. C.



JUNE.

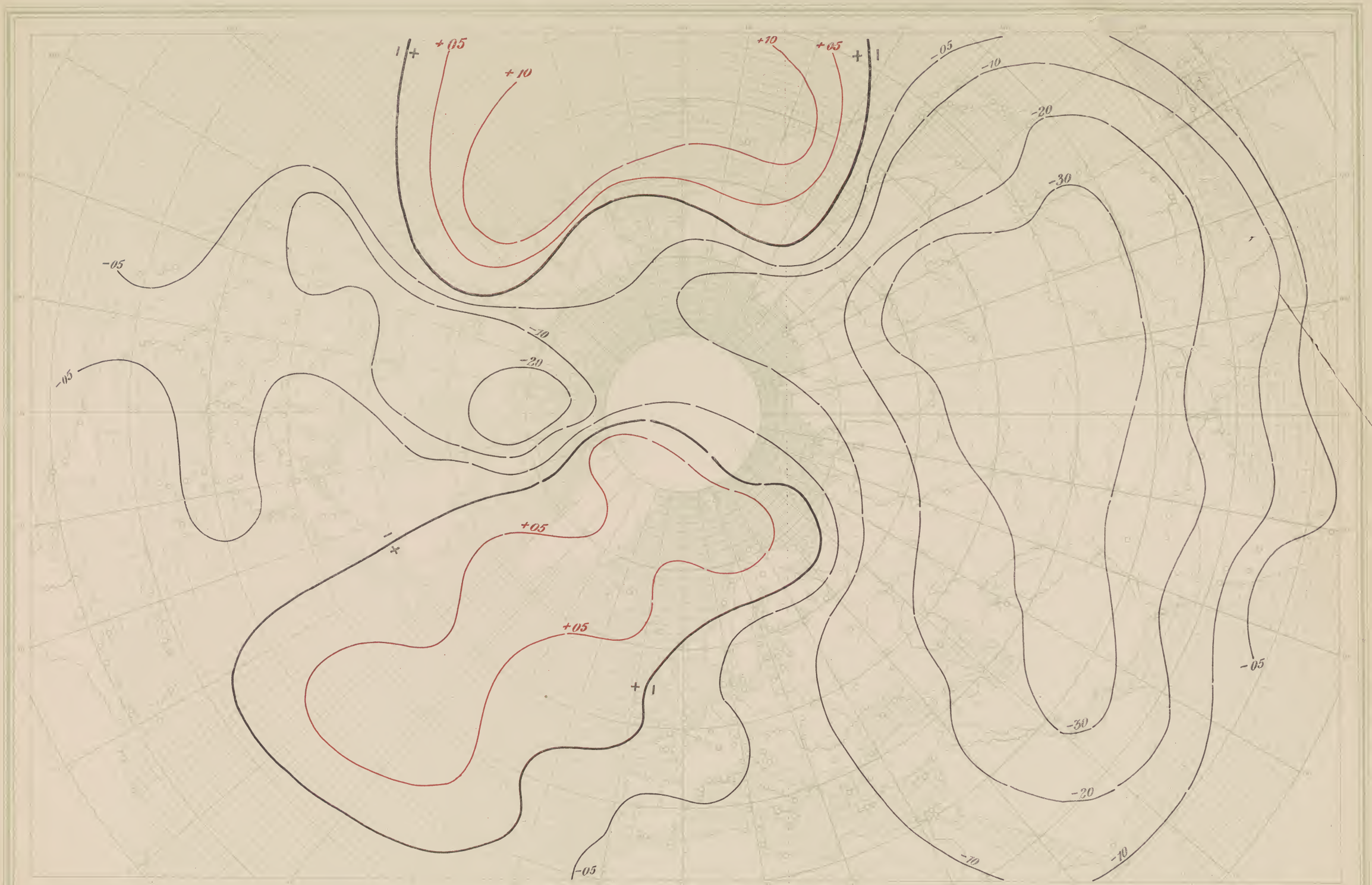
Departure of Monthly Normal Pressure from Annual Normal Pressure for the Northern Hemisphere, determined from International Simultaneous Meteorological Observations taken at noon (Greenwich time), from 1878 to 1887.

CHART 32.—UNITED STATES DEPARTMENT OF AGRICULTURE, WEATHER BUREAU, WASHINGTON, D.C.

JULY.

Departure of Monthly Normal Pressure from Annual Normal Pressure for the Northern Hemisphere, determined from International Simultaneous Meteorological Observations taken at noon (Greenwich time), from 1878 to 1887.

CHART 33.—UNITED STATES DEPARTMENT OF AGRICULTURE, WEATHER BUREAU, WASHINGTON, D.C.



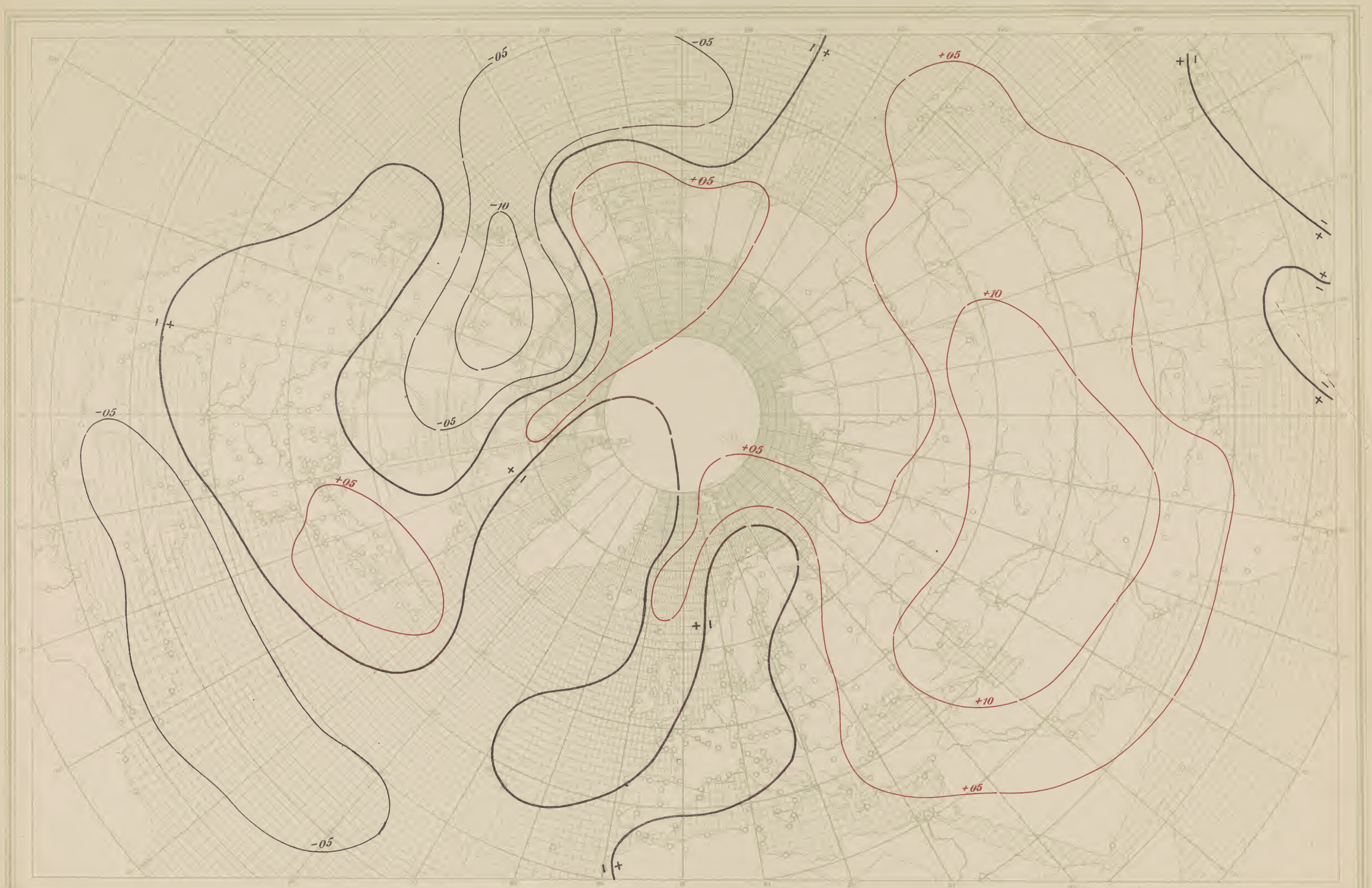
AUGUST.

Departure of Monthly Normal Pressure from Annual Normal Pressure for the Northern Hemisphere, determined from International Simultaneous Meteorological Observations taken at noon (Greenwich time), from 1878 to 1887.

SEPTEMBER.

Departure of Monthly Normal Pressure from Annual Normal Pressure for the Northern Hemisphere, determined from International Simultaneous Meteorological Observations taken at noon (Greenwich time), from 1878 to 1887.

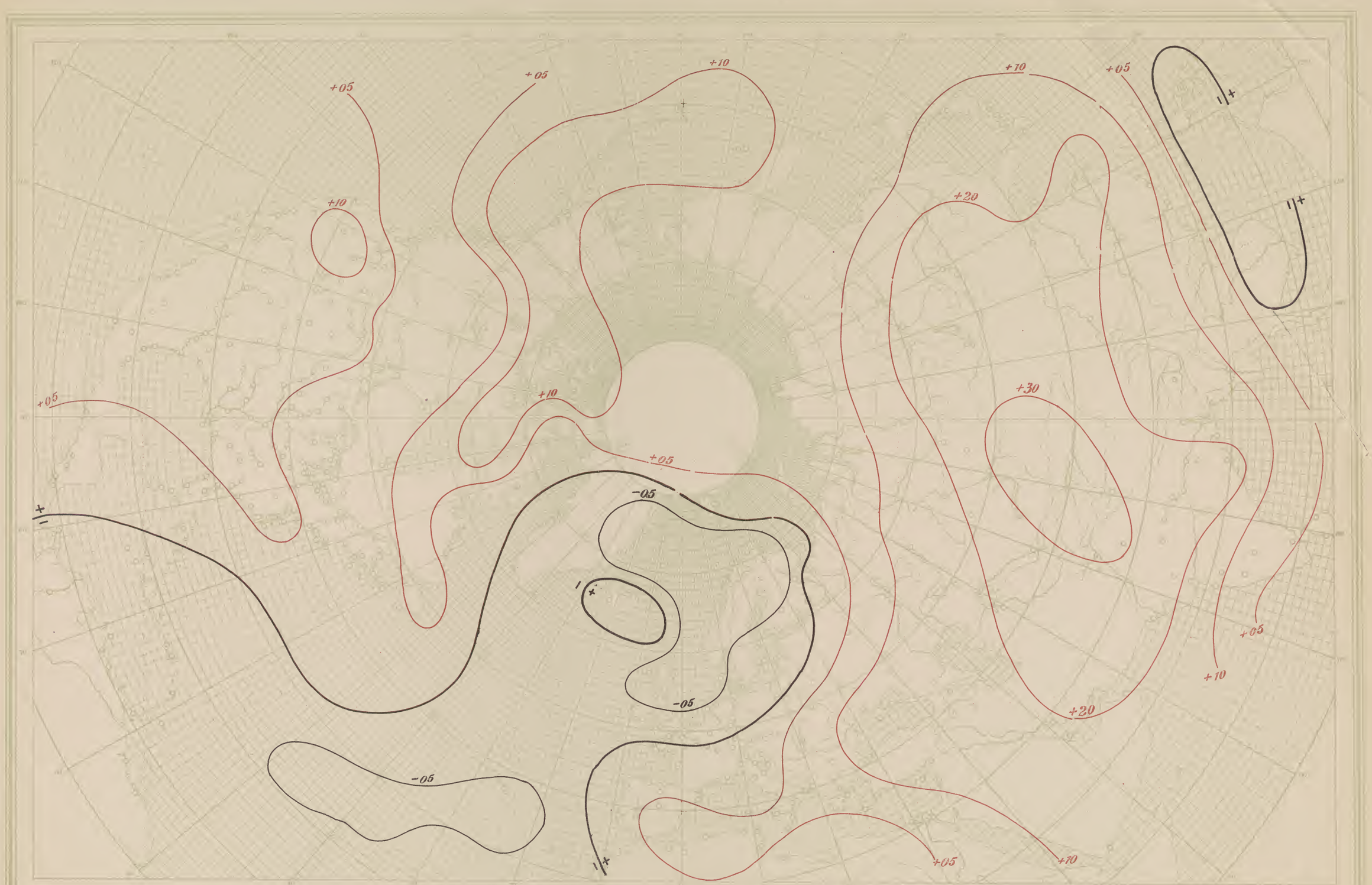
CHART 35.—UNITED STATES DEPARTMENT OF AGRICULTURE, WEATHER BUREAU, WASHINGTON, D. C.



OCTOBER.

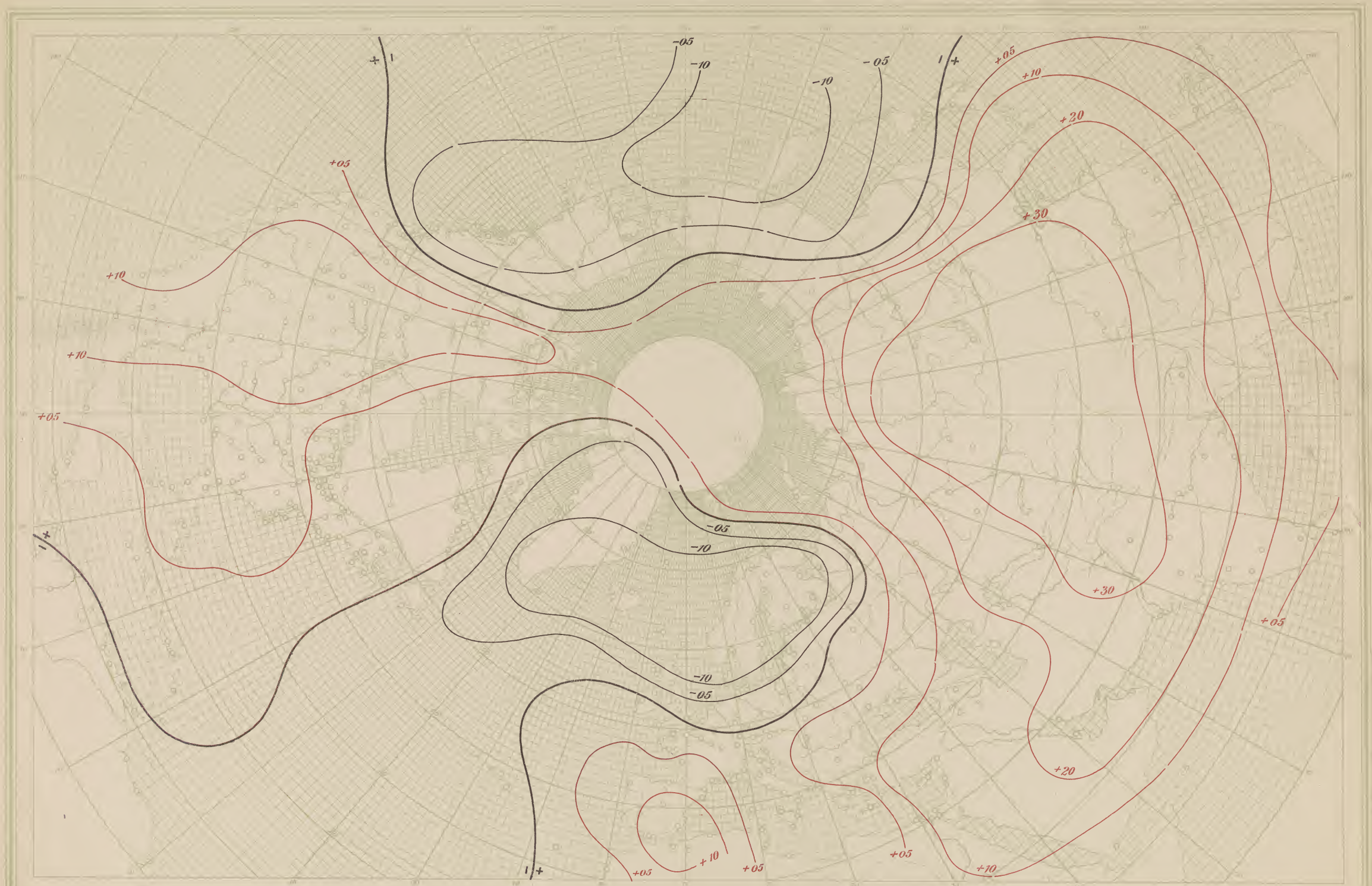
Departure of Monthly Normal Pressure from Annual Normal Pressure for the Northern Hemisphere, determined from International Simultaneous Meteorological Observations taken at noon (Greenwich time), from 1878 to 1887.

CHART 36.—UNITED STATES DEPARTMENT OF AGRICULTURE, WEATHER BUREAU, WASHINGTON, D. C.



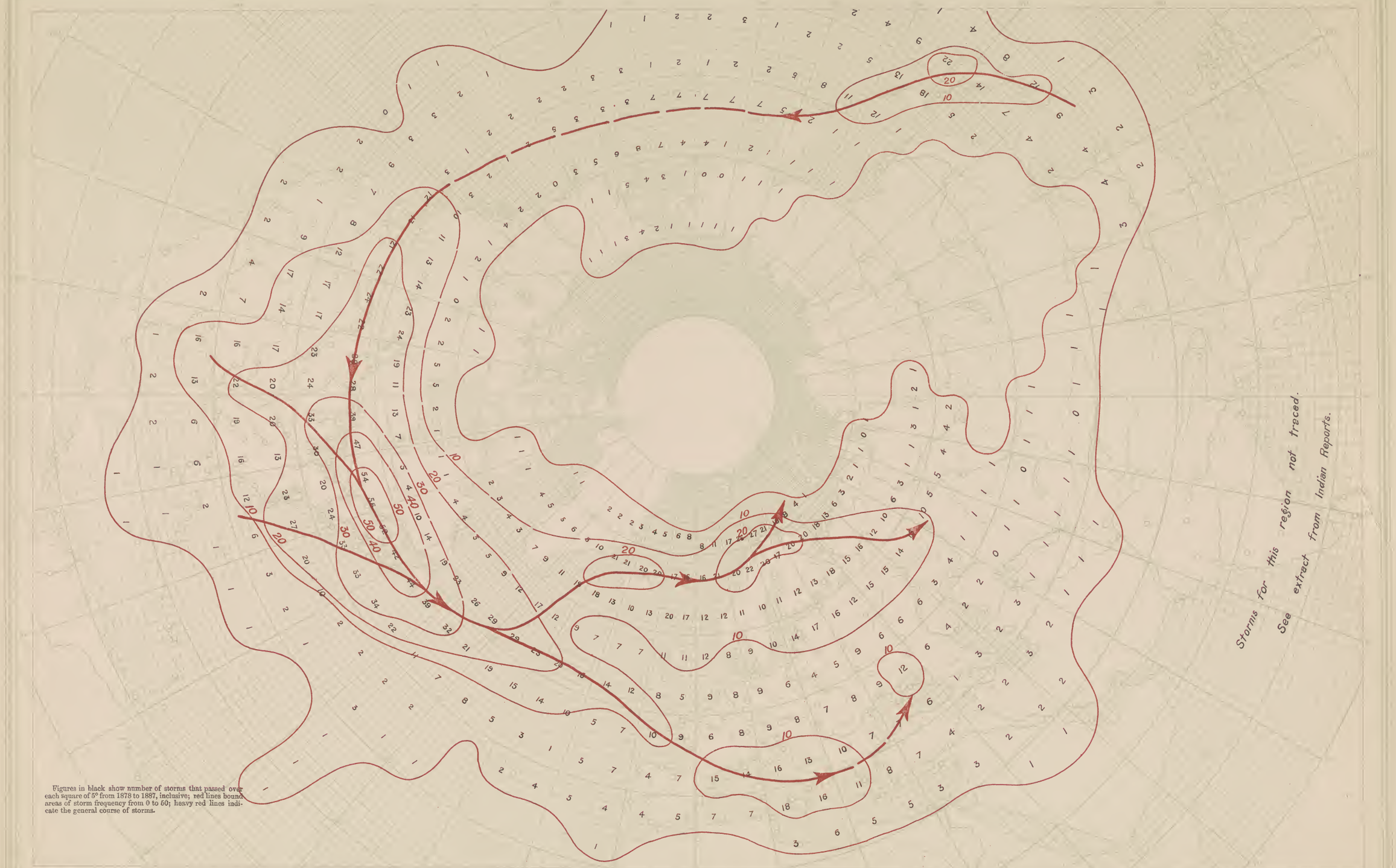
NOVEMBER.

Departure of Monthly Normal Pressure from Annual Normal Pressure for the Northern Hemisphere, determined from International Simultaneous Meteorological Observations taken at noon (Greenwich time), from 1878 to 1887.



DECEMBER.

Departure of Monthly Normal Pressure from Annual Normal Pressure for the Northern Hemisphere, determined from International Simultaneous Meteorological Observations taken at noon (Greenwich time), from 1878 to 1887.

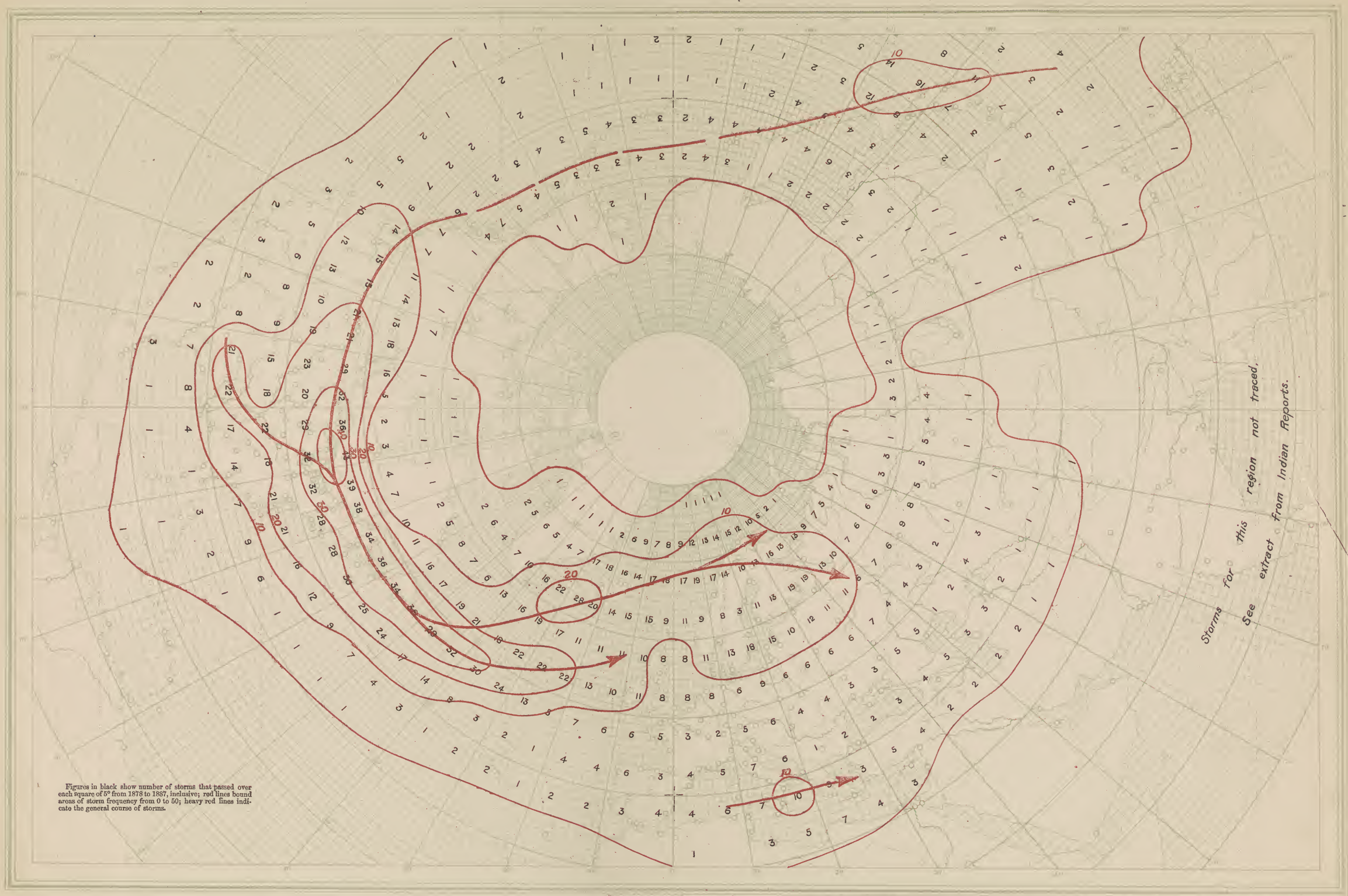


Figures in black show number of storms that passed over each square of 5° from 1878 to 1887, inclusive; red lines bound areas of storm frequency from 0 to 60; heavy red lines indicate the general course of storms.

JANUARY.

Storm frequency over the Northern Hemisphere, determined from International Simultaneous Meteorological Observations taken at noon (Greenwich time), from 1878 to 1887.

CHART 41.—UNITED STATES DEPARTMENT OF AGRICULTURE, WEATHER BUREAU, WASHINGTON, D.C.



Figures in black show number of storms that passed over each square of 5° from 1878 to 1887, inclusive; red lines bound areas of storm frequency from 0 to 50; heavy red lines indicate the general course of storms.

FEBRUARY.

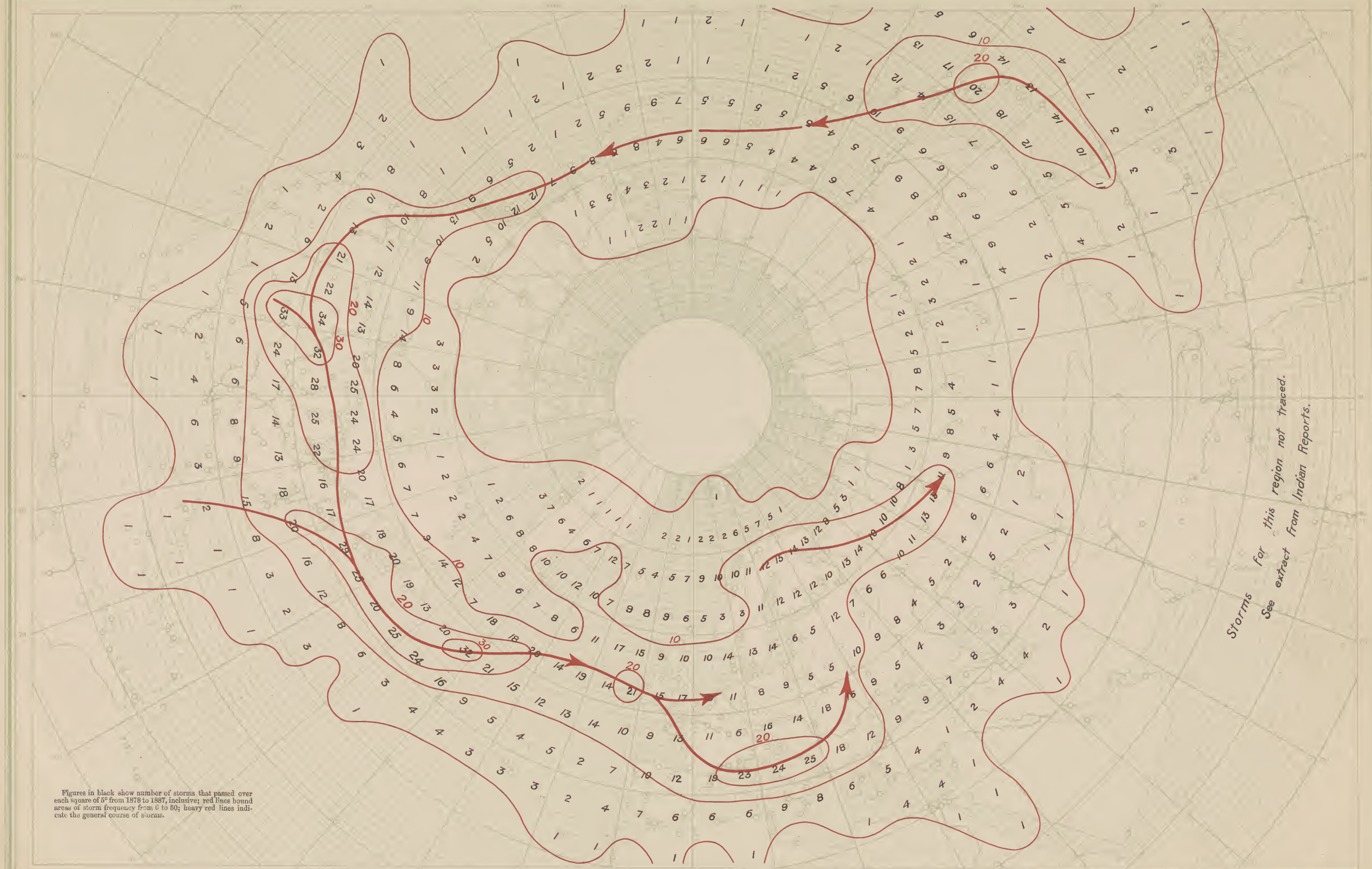
Storm frequency over the Northern Hemisphere, determined from International Simultaneous Meteorological Observations taken at noon (Greenwich time), from 1878 to 1887.

Figures in black show number of storms that passed over each square of 5° from 1878 to 1887, inclusive; red lines bound areas of storm frequency from 0 to 50; heavy red lines indicate the general course of storms.

Storms for this region not traced.
See extract from Indian Reports.

MARCH.

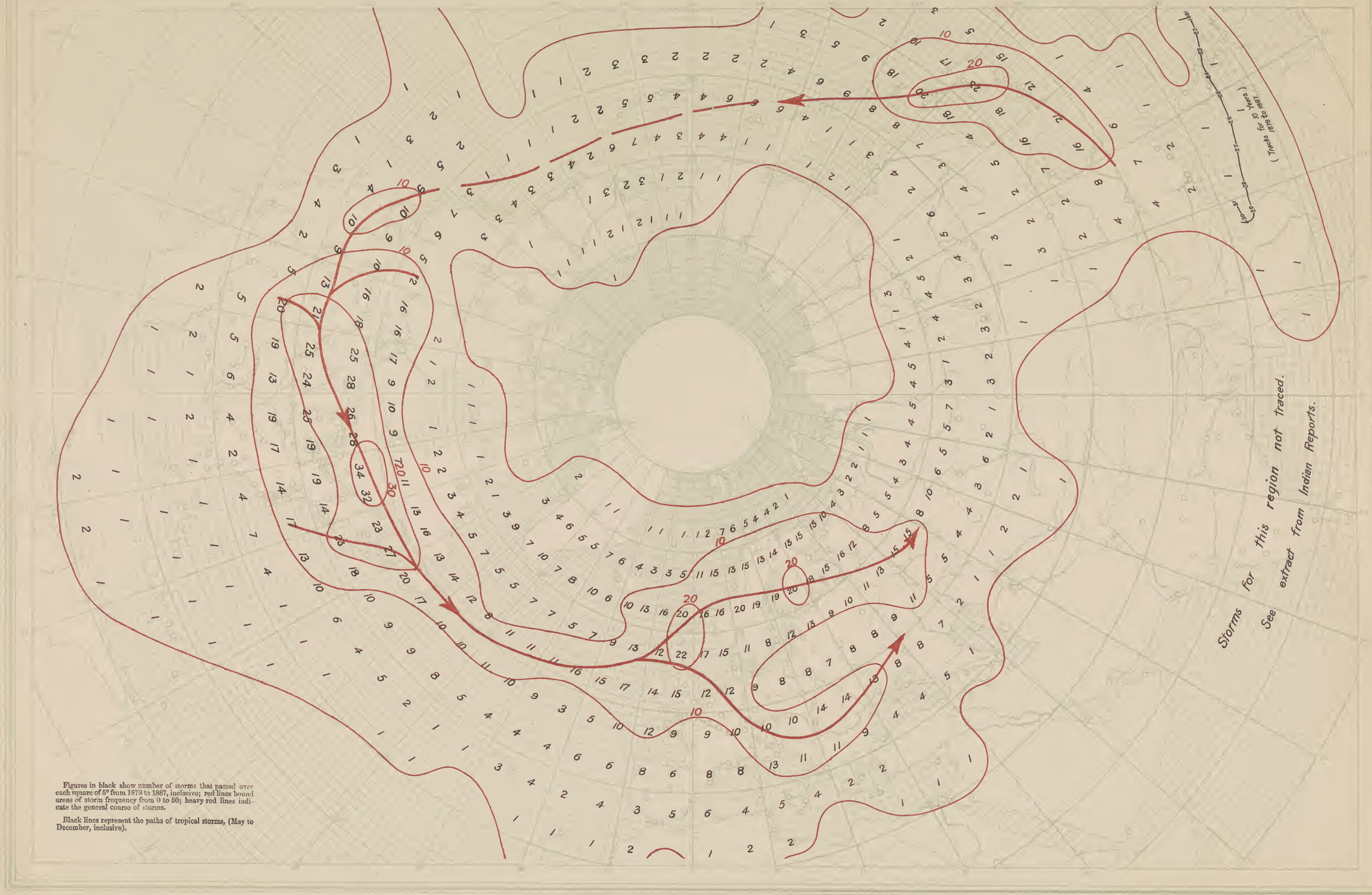
Storm frequency over the Northern Hemisphere, determined from International Simultaneous Meteorological Observations taken at noon (Greenwich time), from 1878 to 1887.



Figures in black show number of storms that passed over each square of 5° from 1878 to 1887, inclusive; red lines bound areas of storm frequency from 6 to 50; heavy red lines indicate the general course of storms.

APRIL.

Storm frequency over the Northern Hemisphere, determined from International Simultaneous Meteorological Observations taken at noon (Greenwich time), from 1878 to 1887.



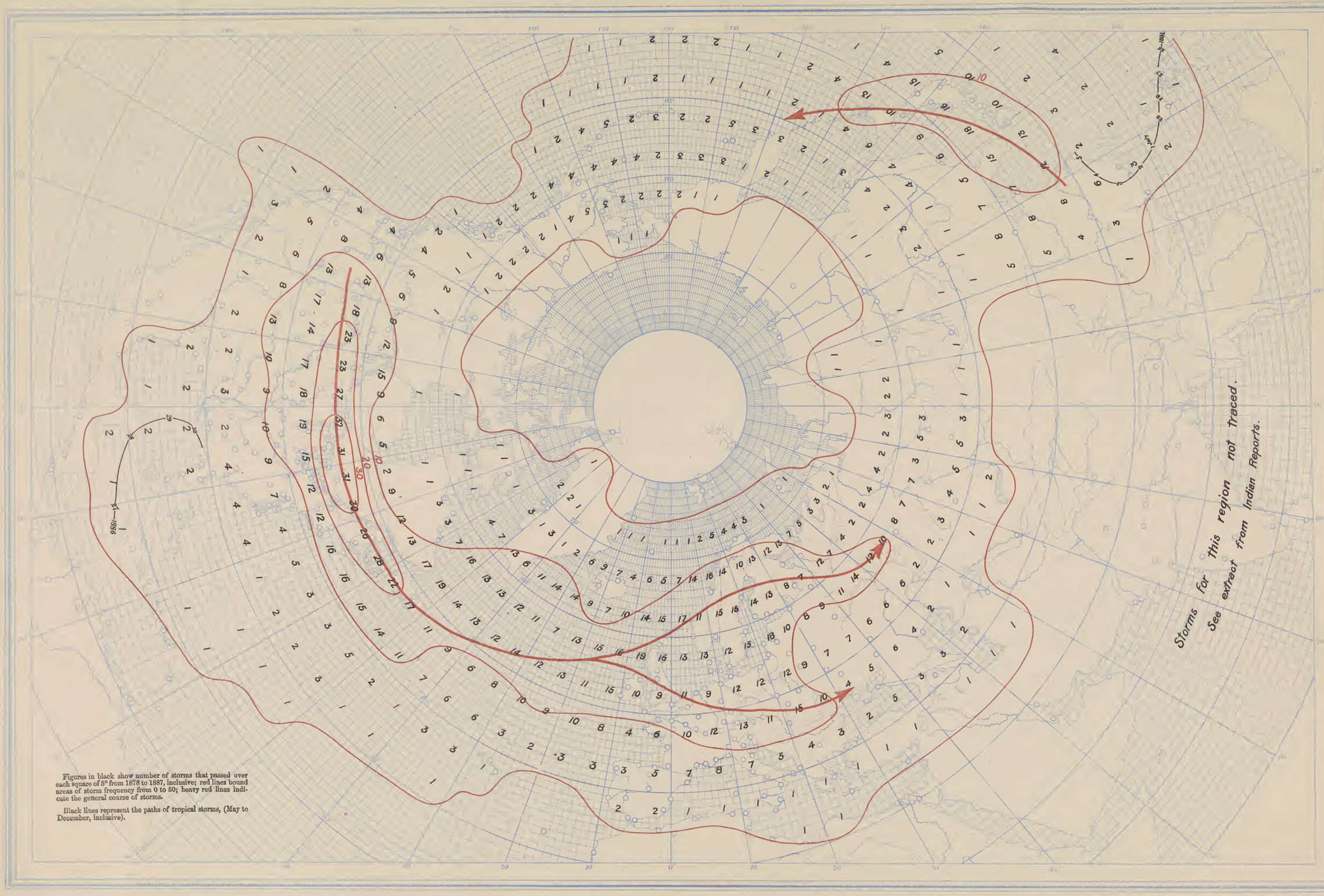
Figures in black show number of storms that passed over each square of 5° from 1878 to 1887, inclusive; red lines bound areas of storm frequency from 0 to 60; heavy red lines indicate the general course of storms.

Black lines represent the paths of tropical storms, (May to December, inclusive).

MAY.

Storm frequency over the Northern Hemisphere, determined from International Simultaneous Meteorological Observations taken at noon (Greenwich time), from 1878 to 1887.

CHART 45.—UNITED STATES DEPARTMENT OF AGRICULTURE, WEATHER BUREAU, WASHINGTON, D. C.

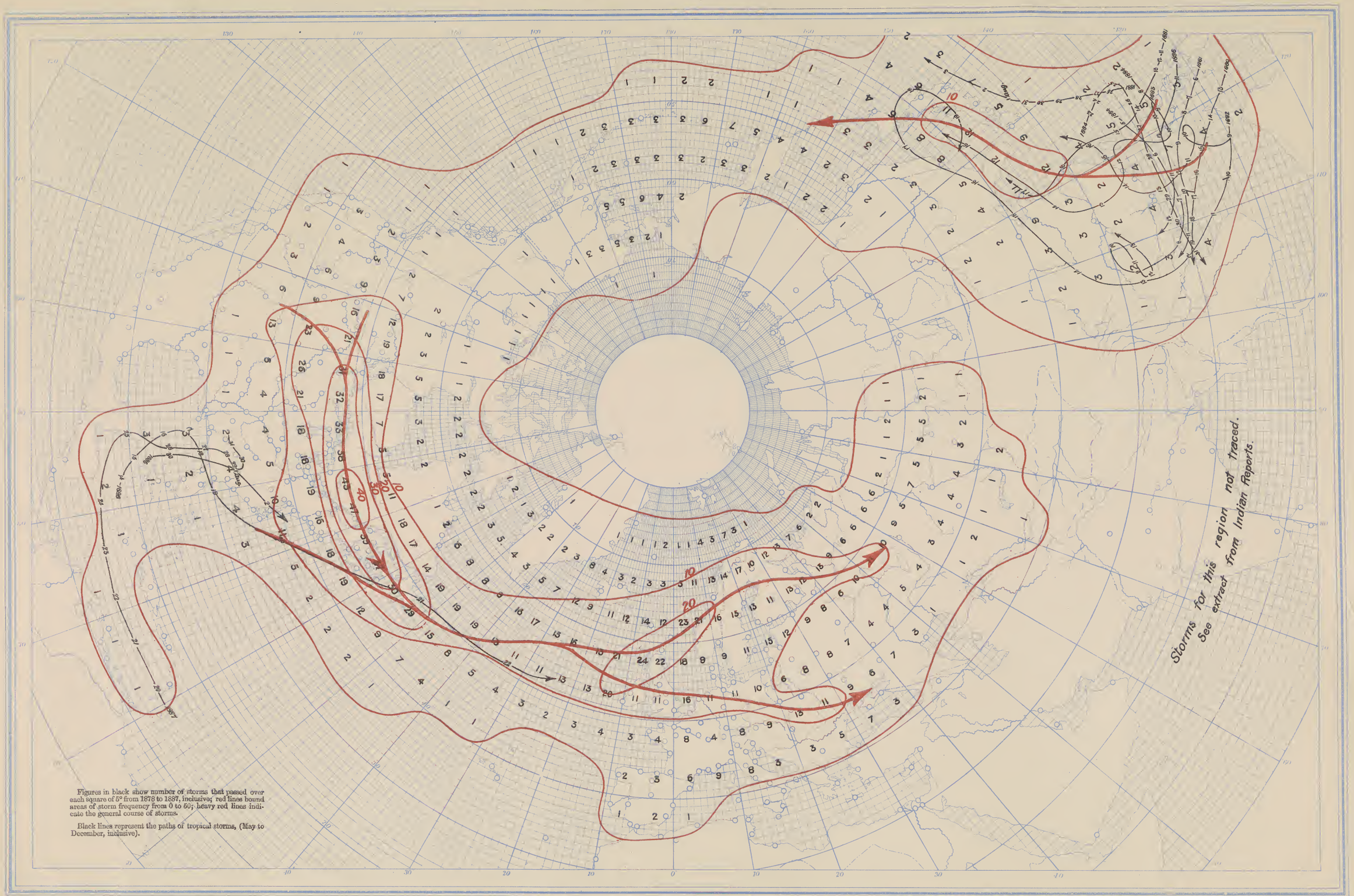


Figures in black show number of storms that passed over each square of 5° from 1878 to 1887, inclusive; red lines bound areas of storm frequency from 0 to 50; heavy red lines indicate the general course of storms.

Black lines represent the paths of tropical storms, (May to December, inclusive).

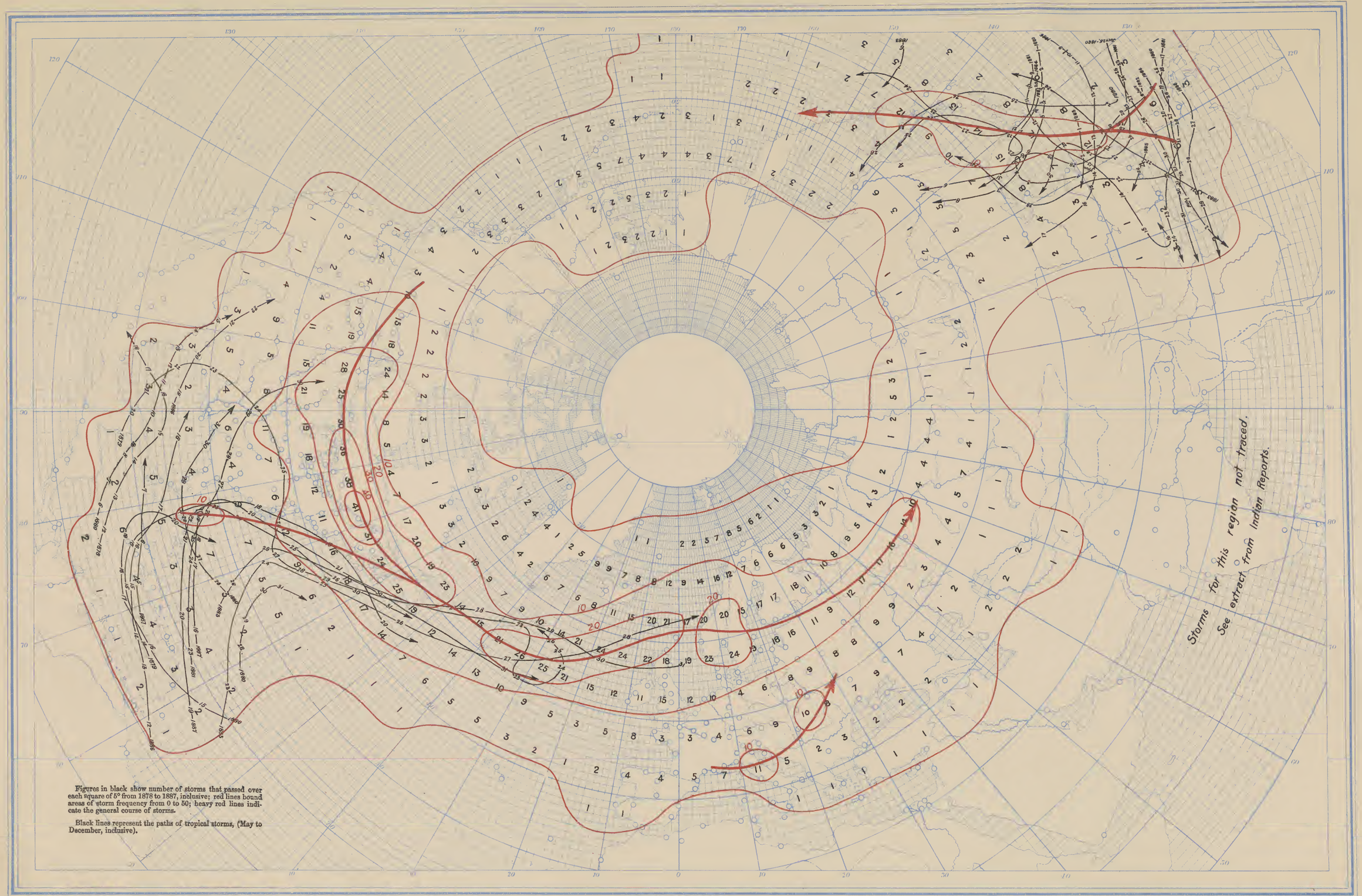
JUNE.

Storm frequency over the Northern Hemisphere, determined from International Simultaneous Meteorological Observations taken at noon (Greenwich time), from 1878 to 1887.



JULY.

Storm frequency over the Northern Hemisphere, determined from International Simultaneous Meteorological Observations taken at noon (Greenwich time), from 1878 to 1887.

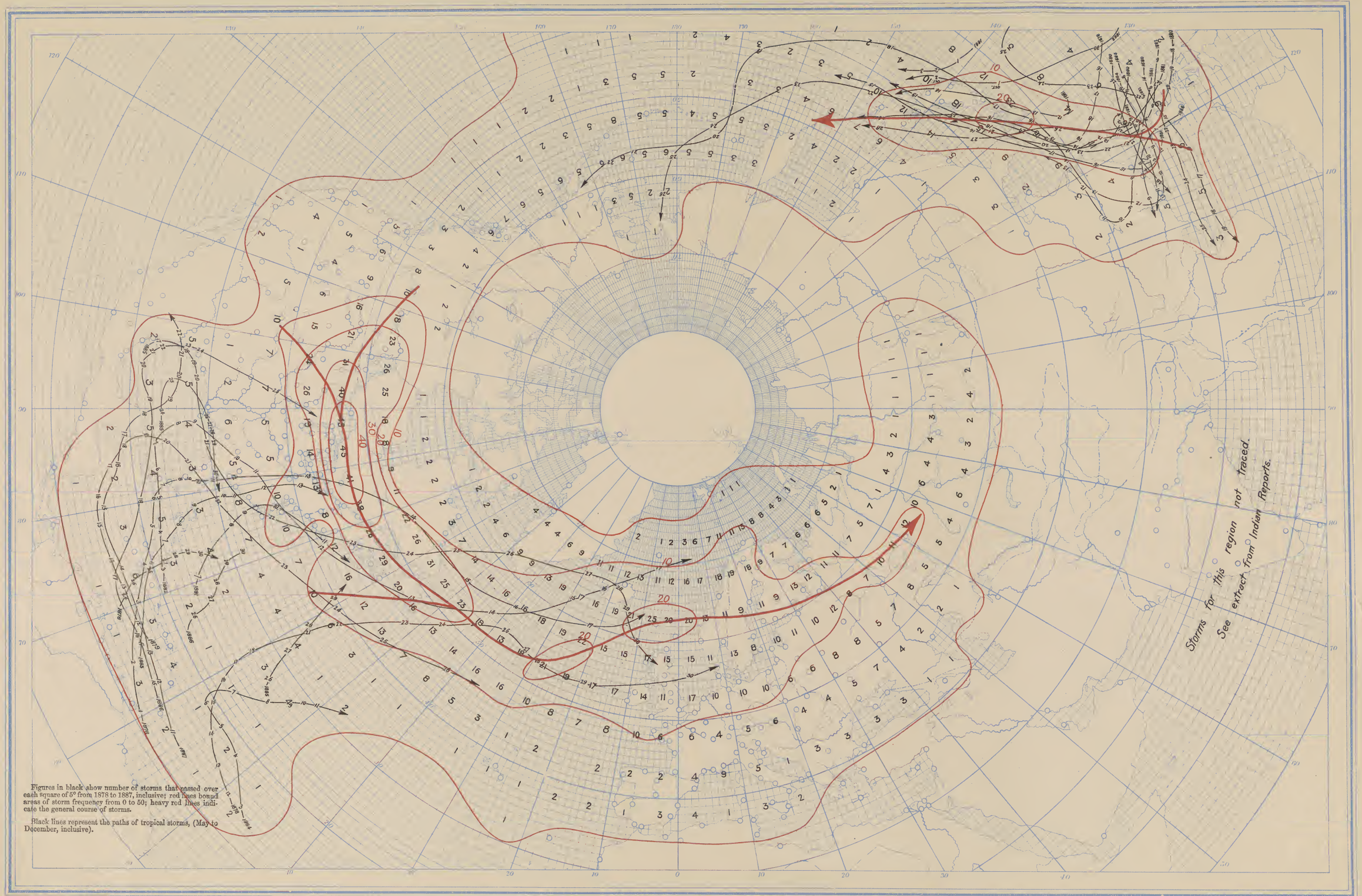


Figures in black show number of storms that passed over each square of 5° from 1878 to 1887, inclusive; red lines bound areas of storm frequency from 0 to 50; heavy red lines indicate the general course of storms.

Black lines represent the paths of tropical storms, (May to December, inclusive).

AUGUST.

Storm frequency over the Northern Hemisphere, determined from International Simultaneous Meteorological Observations taken at noon (Greenwich time), from 1878 to 1887.

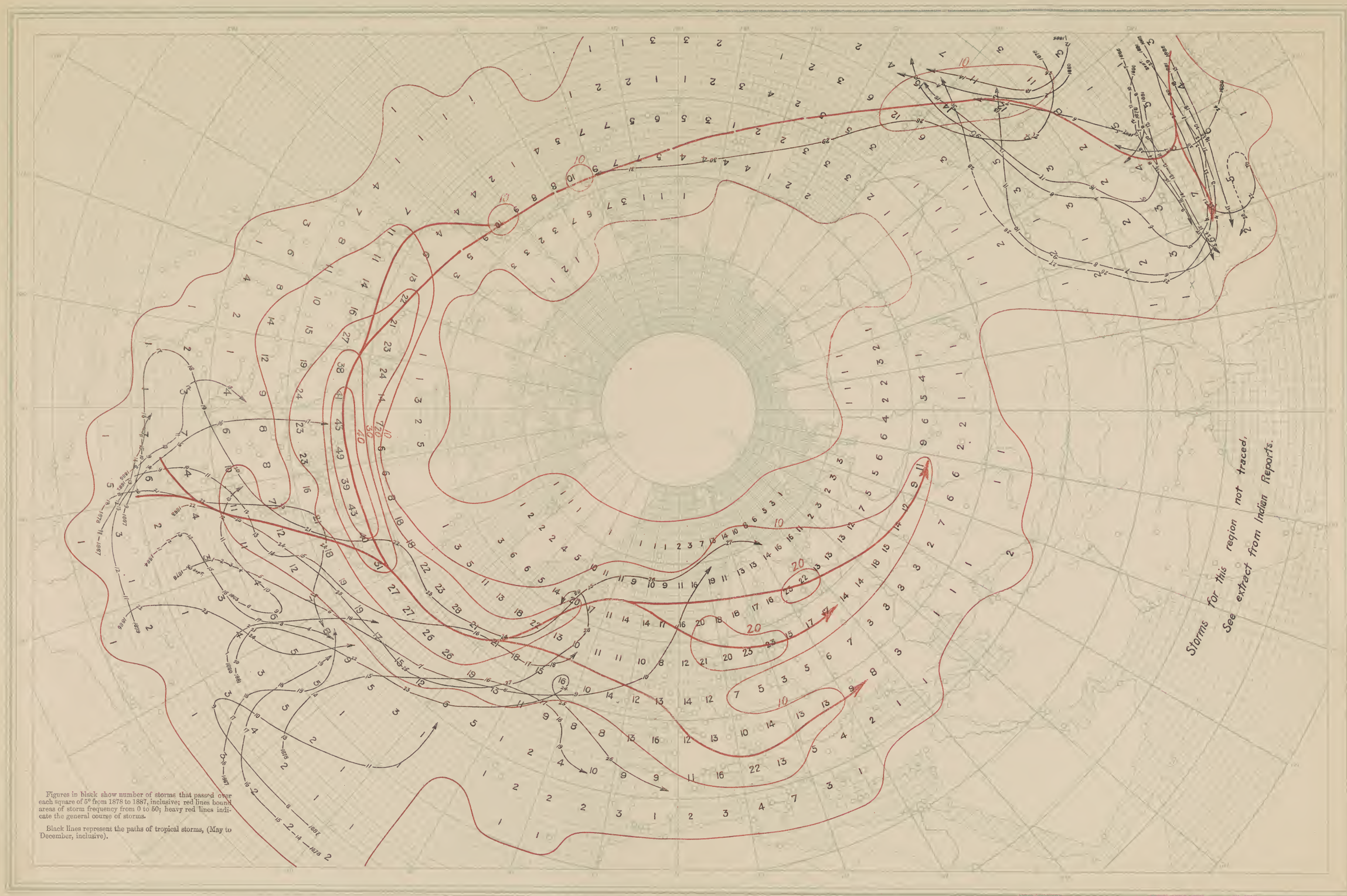


Figures in black show number of storms that passed over each square of 5° from 1878 to 1887, inclusive; red lines bound areas of storm frequency from 0 to 50; heavy red lines indicate the general course of storms.

Black lines represent the paths of tropical storms, (May to December, inclusive).

SEPTEMBER.

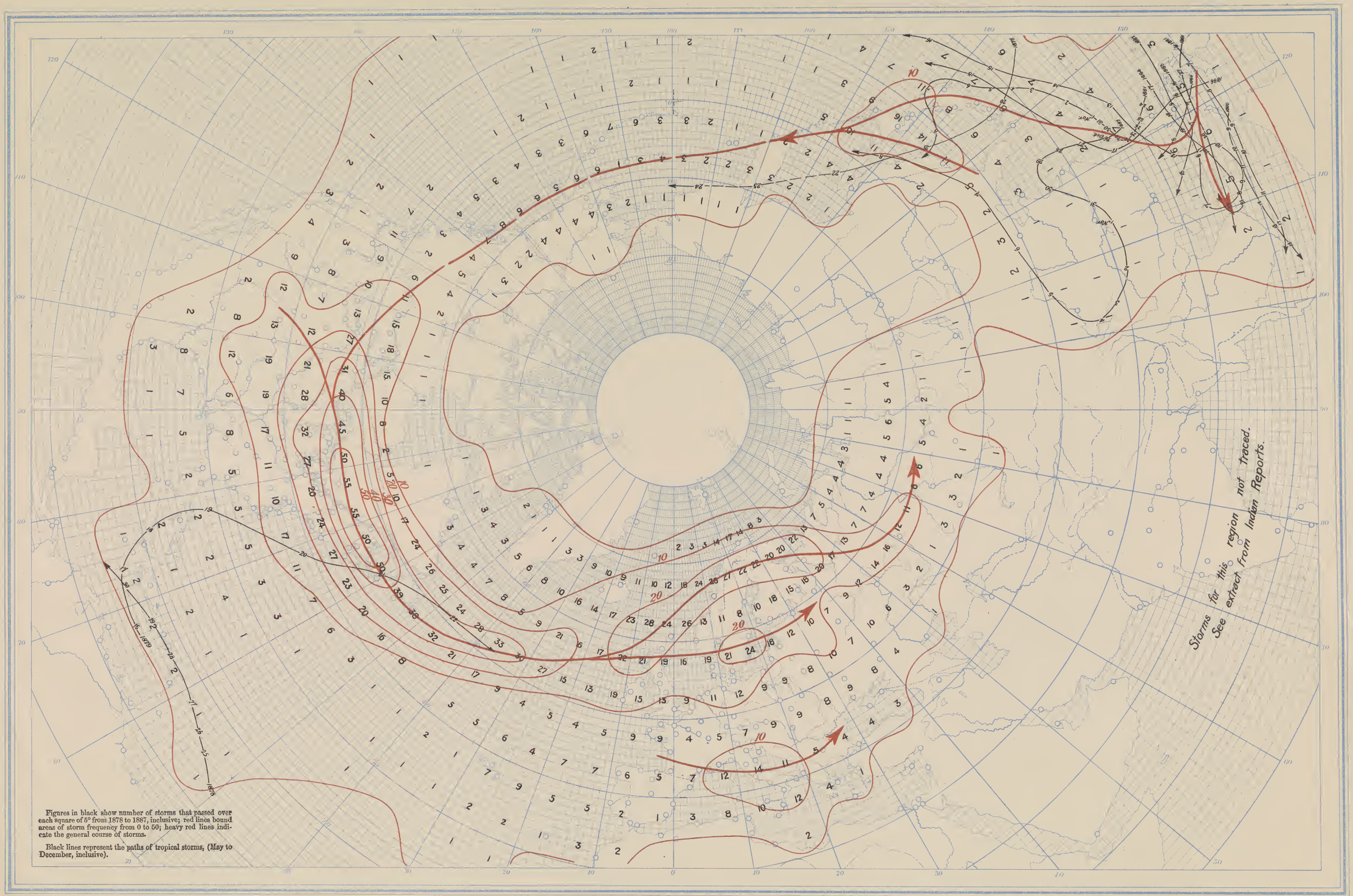
Storm frequency over the Northern Hemisphere, determined from International Simultaneous Meteorological Observations taken at noon (Greenwich time), from 1878 to 1887.



OCTOBER.

Storm frequency over the Northern Hemisphere, determined from International Simultaneous Meteorological Observations taken at noon (Greenwich time), from 1878 to 1887.

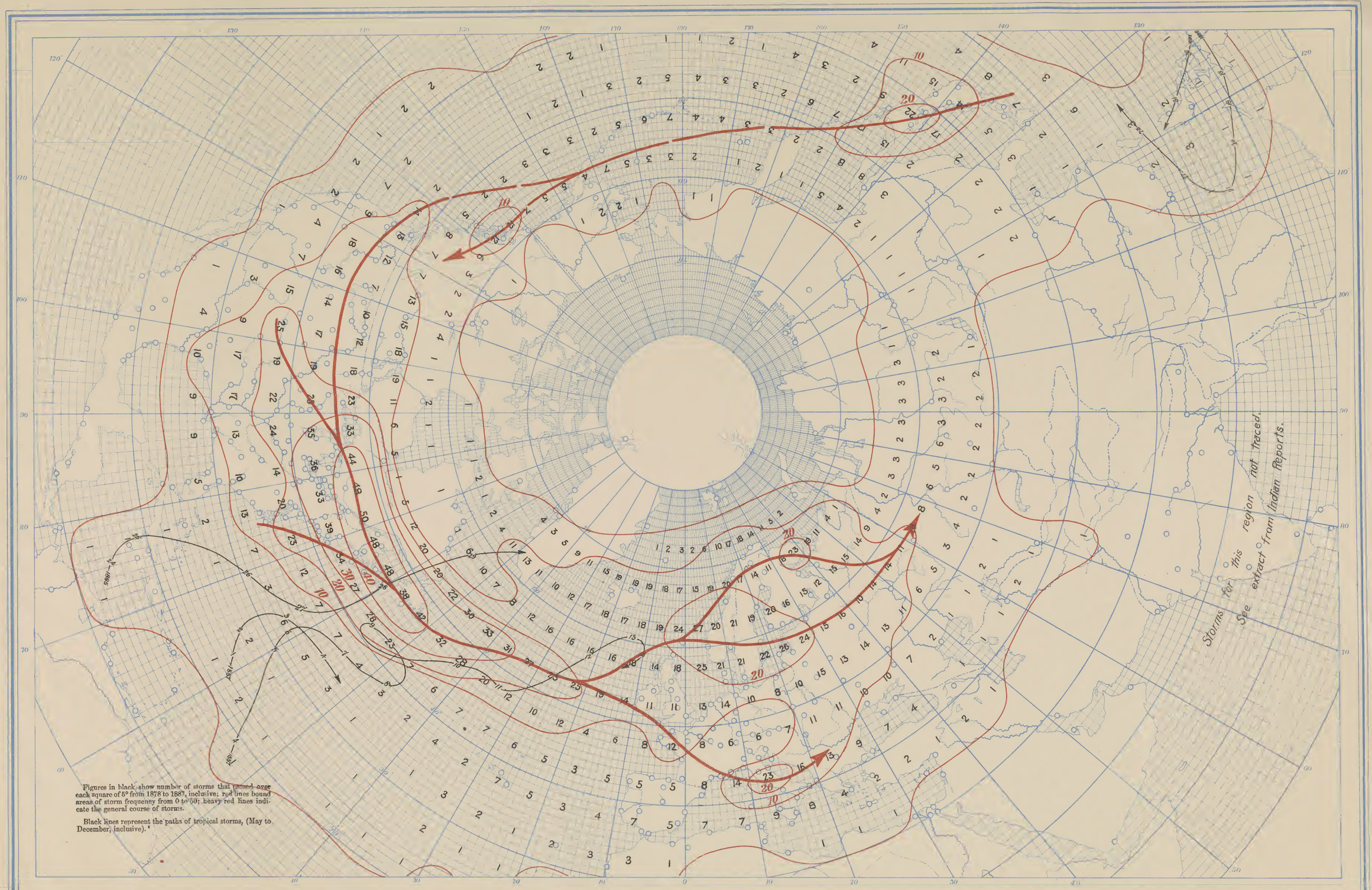
CHART 50.—UNITED STATES DEPARTMENT OF AGRICULTURE, WEATHER BUREAU, WASHINGTON, D.C.



NOVEMBER.

Storm frequency over the Northern Hemisphere, determined from International Simultaneous Meteorological Observations taken at noon (Greenwich time), from 1878 to 1887.

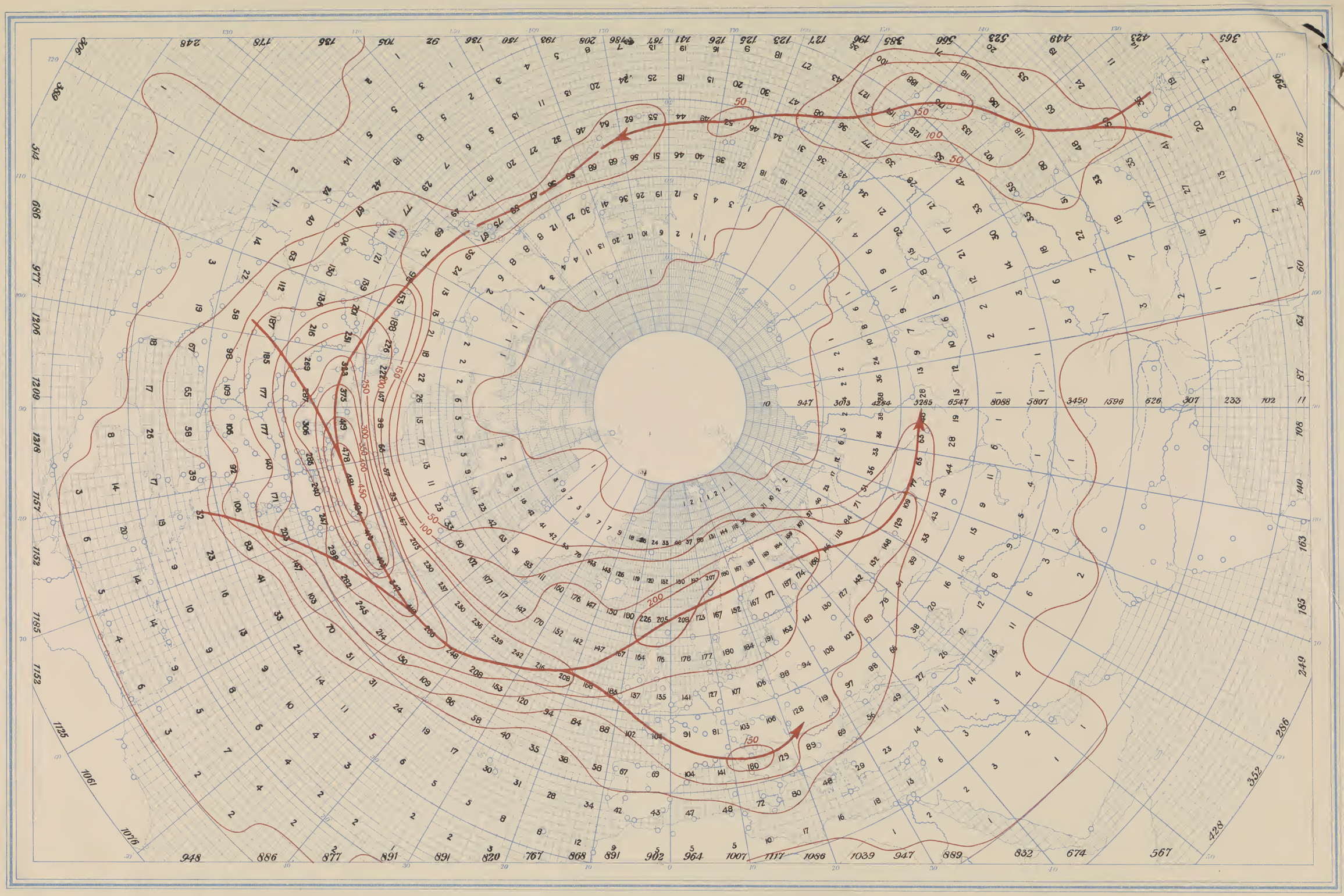
CHART 51.—UNITED STATES DEPARTMENT OF AGRICULTURE, WEATHER BUREAU, WASHINGTON, D. C.



DECEMBER.

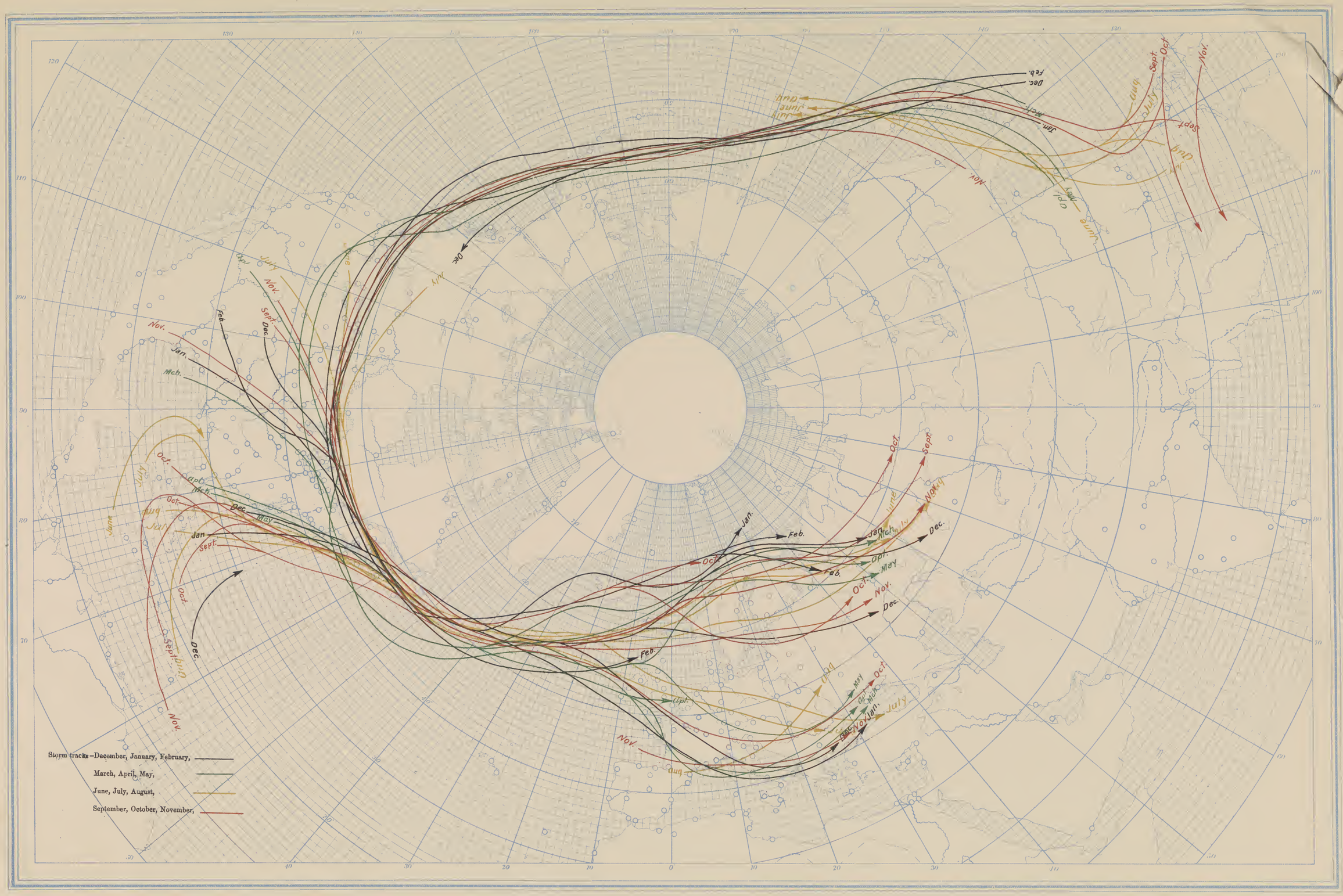
Storm frequency over the Northern Hemisphere, determined from International Simultaneous Meteorological Observations taken at noon (Greenwich time), from 1878 to 1887.

CHART 52.—UNITED STATES DEPARTMENT OF AGRICULTURE, WEATHER BUREAU, WASHINGTON, D.C.



Storm frequency over the Northern Hemisphere for ten years, determined from International Simultaneous Meteorological Observations taken at noon (Greenwich time), from 1878 to 1887.

CHART 53.—UNITED STATES DEPARTMENT OF AGRICULTURE, WEATHER BUREAU, WASHINGTON, D. C.



Average tracks of storms, by months and seasons, over the Northern Hemisphere, 1878 to 1887, inclusive.

Chart 54.—Normal Pressure for January, ——— Mean Pressure for January, 1880, ———

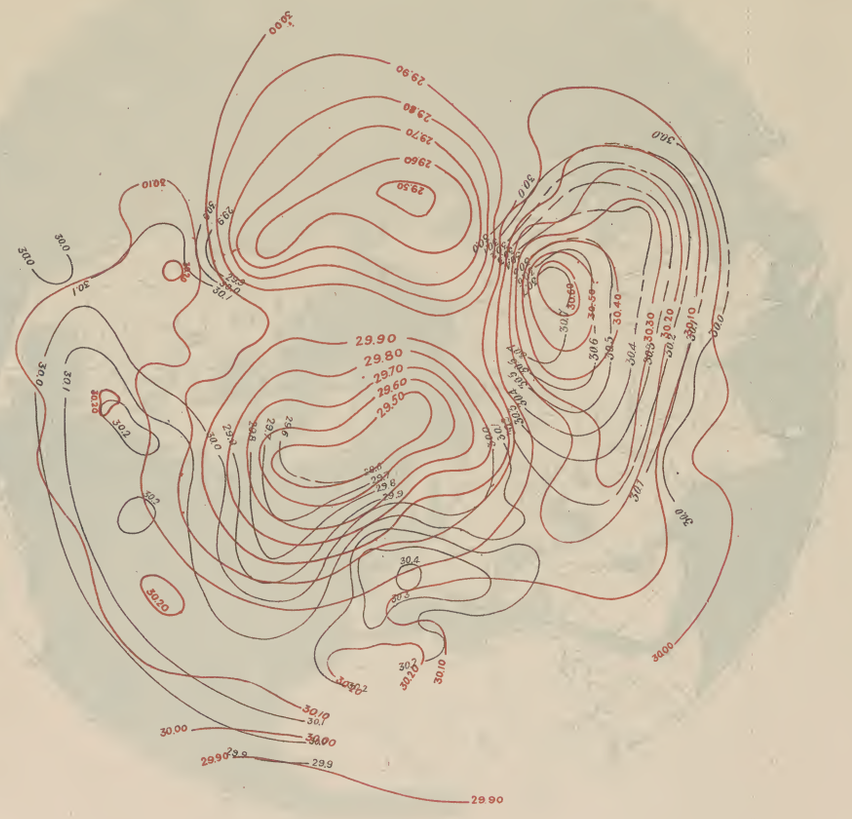


Chart 55.—Normal Pressure for January, ——— Mean Pressure for January, 1886, ———

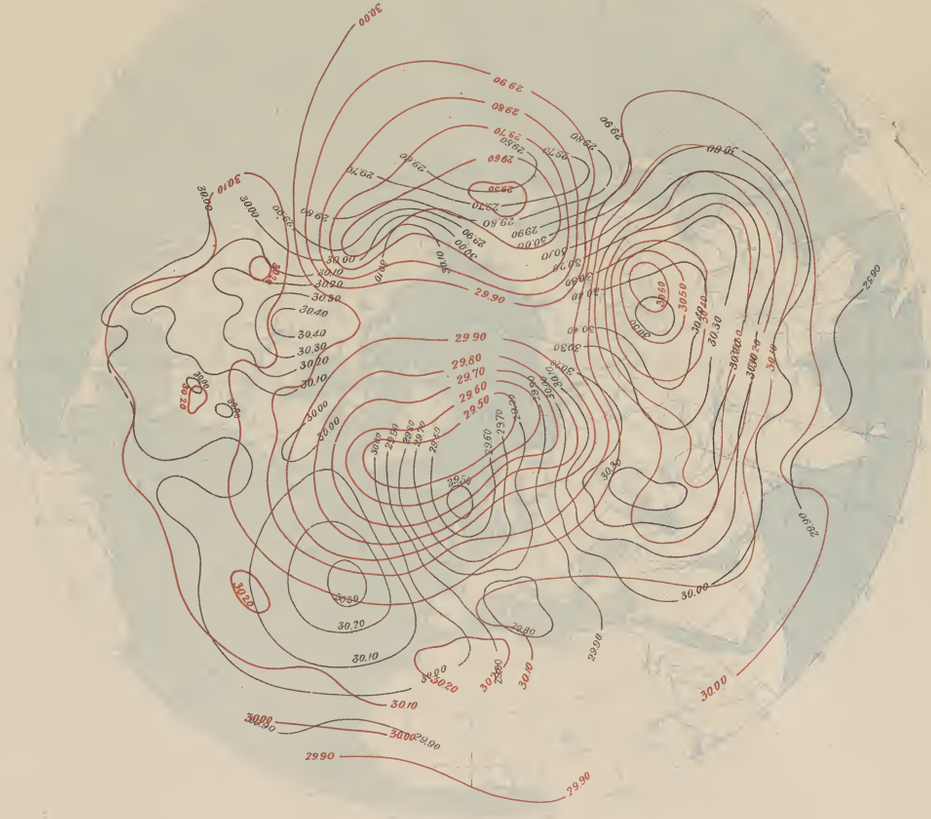


Chart 56.—Normal Pressure for August, ——— Mean Pressure for August, 1881, ———

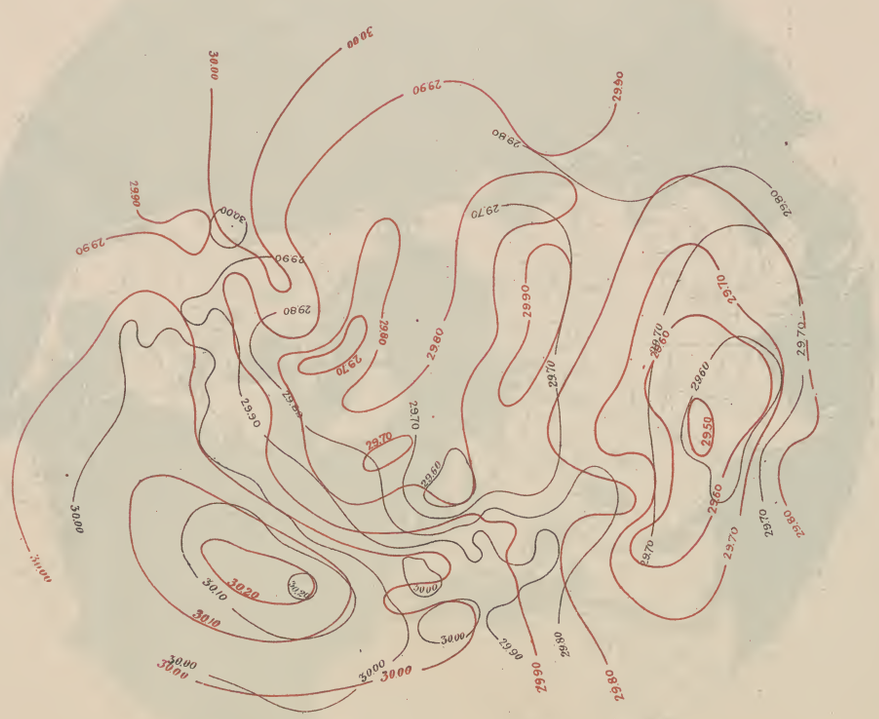


Chart 57.—Normal Pressure for August, ——— Mean Pressure for August, 1885, ———

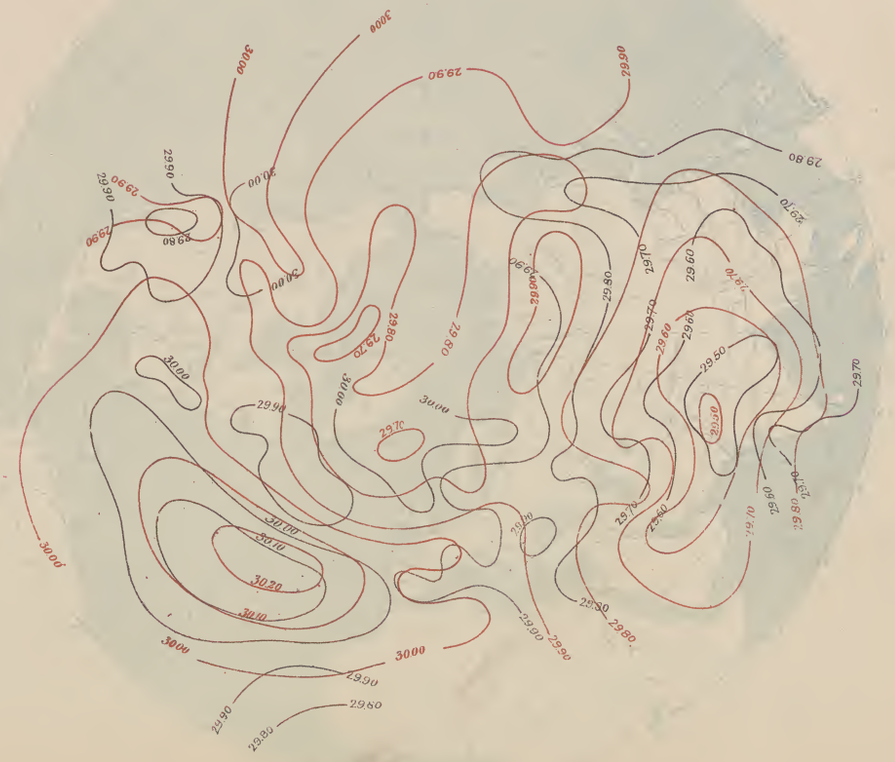


Chart 58.—Normal Pressure for January, ——— Mean Pressure for January, 1884, ———

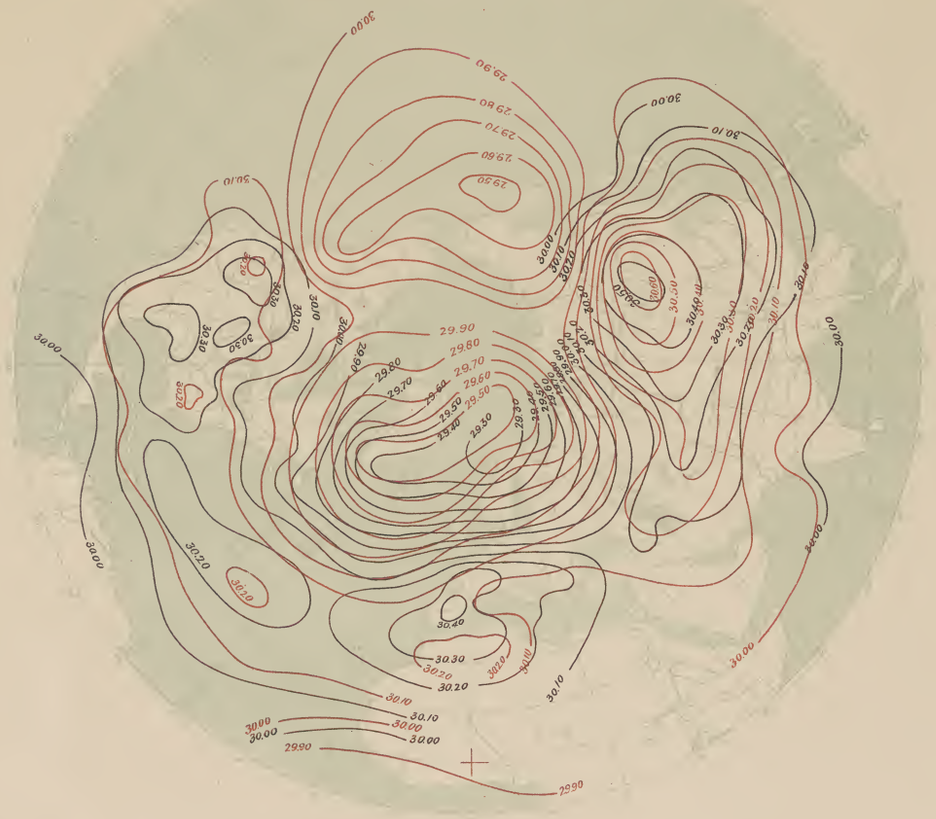


Chart 59.—Normal Pressure for January,

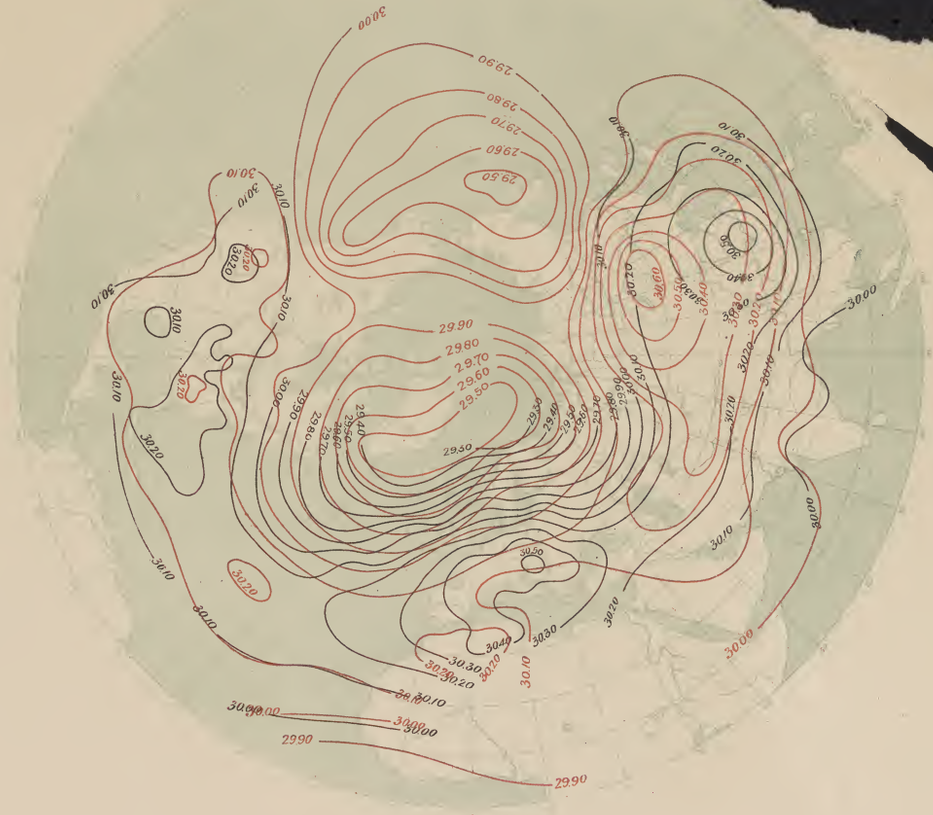


Chart 60.—Normal Pressure for July, ——— Mean Pressure for July, 1882, ———

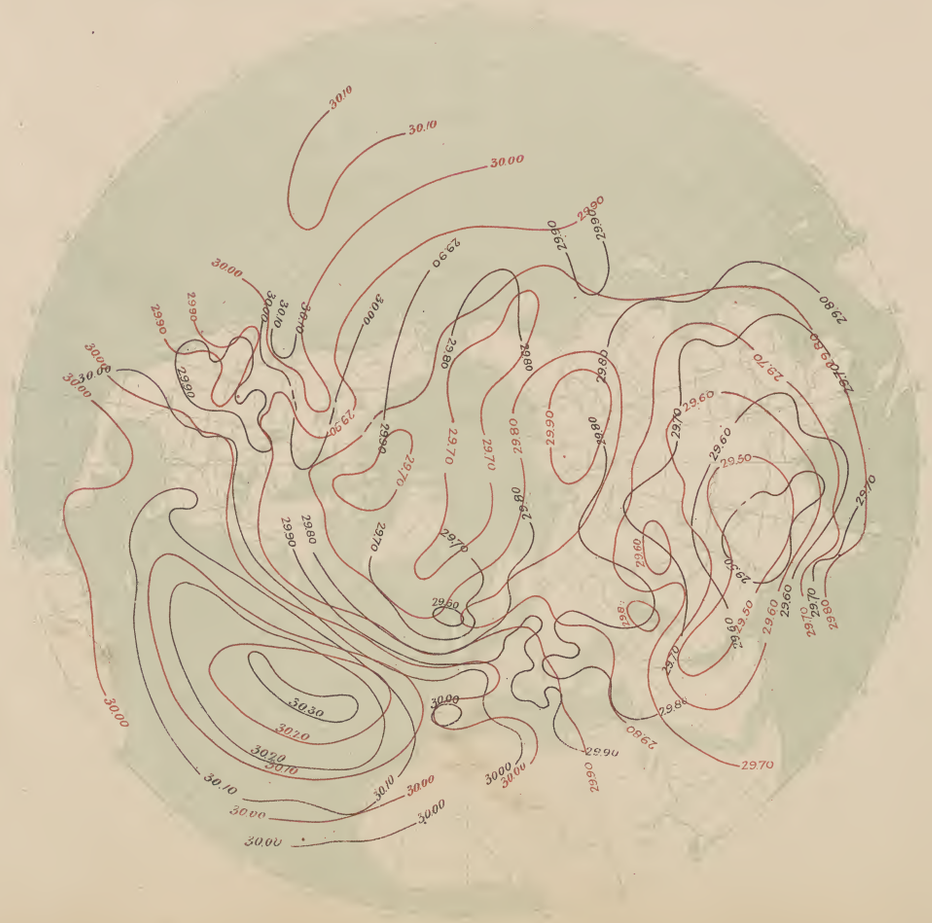


Chart 61.—Normal Pressure for August, ——— Mean Pressure for August, 1885, ———